A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

Construction Methods

WORKING THREE ABREAST in winter weather, paving mixers concrete military airport runways in 25-ft. wide lanes

JUNE-1943

Army Airport Concreting in Near-Zero Weather • Building $45,000,000 Naval Supply Depot • Wartime Maintenance of British Roads—By Sir Frederick Cook • Laying All-Welded Water Main • Welding Technique on "Big Inch" Oil Pipeline

McGRAW-HILL PUBLISHING COMPANY, INC. • PRICE 50 CENTS

How to Cut Replacement Costs

and Send More Steel to War

Regular inspections, adequate painting, and frequent lubrication, will cut replacement costs and save steel that is vitally needed in every quarter of the globe by America and her Allies.

Initiate, today, a special wartime inspection service. Examine roofs, siding, and structural members of buildings—especially where atmospheric conditions, or process fumes, result in destructive corrosion. Clean and paint steel that shows signs of deterioration. Consult a reliable paint manufacturer if standard paints do not prove satisfactory.

Many types of manufacturing equipment—trucks, cranes, and the like—operate in and out of doors. Such equipment should not only be painted, but moving parts should be adequately lubricated to save the steel that otherwise would be needed for replacement of parts.

The moving parts of all types of machinery should be regularly inspected to make certain that operators are applying lubricating oils and greases of the correct qualities, and in the right quantities. If undue wear of moving parts continues, ask a lubricant manufacturer for advice.

Take better care of the steel now serving you. Less steel used for replacement means more steel for the fighting fronts.

ARMY E NAVY

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CURRENT JOBS

.... and Who's Doing Them

BUILDINGS

Public — Navy Department awarded $11,972,524 contract for additional facilities in Pleasanton, Calif., to **McNeil Construction Co.**, of Los Angeles. **Maxon Construction Corp., Inc.**, of Dayton, Ohio, was awarded $8,653,000 Navy Department contract for additional building facilities in Hastings, Neb. Dwelling units costing $3,295,063 will be built in Fort Worth, Tex., by **R. P. Farnsworth & Co., Inc.**, of New Orleans, La. Additional work at Texas blast furnace project, including coke ovens, will be done by **Austin Bridge Co.**, of Dallas. A $2,300,000 housing contract in Brunswick, Ga., was awarded to **J. A. Jones Construction Co.**, of Charlotte, N. C. Contract for $1,800,000 expansion of Naval Hospital facilities at Long Beach, Calif., went to **P. J. Walker Co.**, of Los Angeles. In Canada, **Diamond Construction Co., Ltd.**, of Fredericton, has contract for building additional frame buildings and magazine stores in Renous, N. B., for an estimated $1,400,000. Additional storage facilities for U. S. Engineers in Bexar County, Tex., are under way by **A. P. Rheiner & Son**, of San Antonio, at $1,000,000 to $5,000,000. In California, $1,094,925 housing contract was awarded to **Standard Building Co.**, of San Francisco.

Commercial — In Provo, Utah, **Taylor & Wheeler**, of Fresno, Calif., is building 341-unit two-story court-type apartment dwellings at an estimated $2,000,000.

HEAVY CONSTRUCTION

Pipeline sections between Beaumont, Tex., and Seymour, Ind., will be built by **Sherman & Allen**, of Houston; **N. A. Saigh Co.**, of San Antonio; **Williams Bros. Corp.**, of Tulsa, Okla.; **B. & M. Construction Corp.**, of Oklahoma City; **Oil States Construction Co.**, of Tulsa; **Swinerton & Walberg**, of San Francisco, Calif.; **Midwestern Engineering & Construction Co.**, of Tulsa, and **J. C. Truman**, of El Dorado, Ark., for total estimated cost of $44,000,000. Navy Department contract for $14,664,800 improvements in Maryland was awarded to **Consolidated Engineering Co., Inc.**, of Baltimore. **John Griffiths & Son Construction Co.**, of Chicago, is building $6,000,000 factory addition in Illinois, with electrical work by **Goldberg & O'Brien Electric Co.**, also of Chicago. In Texas, **Brown & Root, Inc.**, **W. S. Bellows Construction Co.** and **Columbia Construction Co.**, of Corpus Christi, were awarded $5,782,500 Navy Department contract for improvements. Six double-barrel hangars at Naval Air station, Patuxent River, Maryland, will be built by **Corbetta Construction Co., Inc.**, of New York, for $5,460,000. Another Navy Department contract for $4,814,420 for facilities in Washington went to **Austin Co.**, of Cleveland, Ohio. In New York, $3,635,000 drydock contract was awarded to **Ira S. Bushey & Sons, Inc.**, of Brooklyn. Contract for improvements at Moffett Field, Sunnyvale, Calif., for $3,500,000 was awarded to **Pittsburgh Des Moines Steel Co.**, of San Francisco. In Cleveland, **Holland Construction Co.**, of Tulsa, Okla., is building natural gas pipeline for an estimated $3,254,000. Fuel storage facilities for Navy in Virgina will be built by **McLean Contracting Co.**, of Baltimore, Md., for $2,350,000. Army contract for improvements in Bossier Parish, La., was awarded to **Weymouth Construction Co.**, of Memphis, for under $2,000,000. Another army contract for clearing in Michigan went to **Julius Porath & Son Co.**, of Detroit, for $1,000,000 to $5,000,000.

HIGHWAYS

Among recent highway contract awards are the following: Florida: $1,400,000 to **Groves, Lundin & Cox Co.**, of Minneapolis, and $649,000 to **Ivy H. Smith Construction Co.**, of Jacksonville. Georgia: $500,000 to $1,000,000 to **W. F. Bowe, Jr.**, of Augusta. Louisiana: $277,468 to **Morse Bros. & Associates, Inc.**, of Arkansas City, Kan. Maryland: $296,906 to **C. J. Langenfelder & Son**, of Rosedale. Michigan: $518,020 to **Taylor Bros. Co., Inc.**, of Birmingham, and $278,295 to **Globe Construction Co.**, of Kalamazoo. Nebraska: $500,000 to $1,000,000 to **Inland Construction Co.**, of Omaha. Texas: more than $1,000,000 to **R. W. Briggs & Co.** and **M. B. Killian**, of San Antonio. Virginia: $357,246 to **Short & Thompson**, of Hopewell, and $227,330 to **W. M. McIntosh, Inc.**, of Richmond.

JUNE, 1943

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Construction Methods

A Pictorial Survey of Current Practice, Equipment and Materials

JOHN ABBINK, Publisher
ROBERT K. TOALIN, Editor — A. E. PAXTON, Manager
Editorial Staff: Vincent B. Smith, Paul Wooton (Washington)
N. A. Bowers (San Francisco) Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The HOW of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

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How **TRACTOR-MOUNTED SUBGRADE TEMPLATE** did finegrading ahead of paving mixer. — p. 49

How **HOT WATER WAS DELIVERED** to paving mixers working in near-zero weather. — p. 49

How **THREE TUNNELS WERE DRIVEN** by full-face drilling with detachable bits. — p. 52

How **FOREPEAKS FOR STEEL CARGO SHIPS** were welded into 54-ton pre-assemblies. — p. 54

How **NAVAL SUPPLY DEPOT** was completed on rush schedule working 60 hours a week. — p. 56

How **PORTABLE HOIST TOWERS** with cantilever platforms handled brick for walls of Naval supply depot building. — p. 57

How **TRACTORS AND BARGES** made difficult land-water trip to deliver oil pipeline supplies. — p. 60

How **WARTIME HIGHWAY MAINTENANCE** is carried on in Great Britain. — p. 62

How **ARC-WELDING TECHNIQUE** was applied to construction of "Big Inch" pipeline. — p. 66

How **CLAMP HELD SECTION OF 24-IN. STEEL PIPE** for welding of joint. — p. 66

How **WING GUARD PROTECTED ARC** and facilitated pipeline welding. — p. 67

How **STIFFLEG DERRICKS** mounted on 145-ft. steel towers erected timber arch trusses for Navy blimp hangar. — p. 68

How **RAIL PULLER** was devised by reconverting excavator rig. — p. 68

How **CORRUGATED METAL PIPE SEWER** was hung on bridge to carry line across river. — p. 68

How **CRAWLER CRANE** erected prefabricated laminated timber arches for drill hall. — p. 69

How **SHATTERPROOF LADDERS** of special construction were designed to prevent accidents. — p. 69

How **ALL-WELDED WATER MAIN** was built to serve war industry area. — p. 70

How **BIG STEEL PENSTOCKS** in 30-ton sections were placed in Shasta Dam. — p. 76

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Electrical Equipment—Weapons and Tools

From miniature motors to mammoth generators, from tiny detector tubes to great broadcasting stations—everything electrical is essential to our war effort

AS this editorial goes to press, newspapers and radio news commentators are telling the dramatic story of the blasting of two mighty Nazi power dams. Floods are sweeping down the Ruhr Valley, Germany's most vital munition production center. Two vast networks of industrial activity lie inert, for the great generators that had fed power to hundreds of plants producing war goods for Hitler, today stand idle. This daring raid will go down in history as one of the most, if not the most devastating of the entire war. It has destroyed two great sources of power, stopping the wheels in hundreds of plants and throwing into darkness thousands of factories and homes.

This epoch making raid by the R.A.F. brings home to us the vital importance of our own power resources those colossal generators from which flows the current that turns the wheels of our great industries, illuminates our factories and homes and runs our electric railways and subways. It makes us realize how dependent we are on electricity and how important is the part of those manufacturers who produce the electrical equipment that makes possible its generation and use.

Beginning with Thomas A. Edison, the inventive genius of electrical manufacturing men has devised more and more efficient ways of generating the current, better and better means of transmitting it and of applying it to do thousands of jobs quicker and better.

The products of electrical manufacturers have become so completely an essential component part of every industrial, business and domestic activity that our economy and our war effort could not go on without it.

In days of peace the laboratories of our electrical industry gave us radio, fluorescent lighting, infra red drying, precision process control, telemetering, split-second circuit breakers and many other things that border on the miraculous.

Today their facilities and their genius are devoted to an all out war of wits with Axis scientists and production men.

Electricity plays a significant part in this war . . . from the "walkie talkie" that brings support to hard pressed outposts, to the mammoth motors on the battleships. While many electrical developments today are cloaked in secrecy the nation will enthusiastically applaud these electrical manufacturers when the curtain is lifted.

The far reaching importance of electrical instruments, apparatus and machines becomes evident when we consider that over 350 different electrical items go into combat vessels and that more than 170 go into a fighter plane. Most of these products are distinctly special in nature and are far removed from their civilian counterparts if, indeed, they have such counterparts.

To the civilian, a light bulb is something so standardized that every need can be filled by any nearby dealer. Our armed forces, by contrast, must have at their disposal more than 400 distinct types of lamps. Some no larger than the head of a match, are so brilliant that they flash signals under a tropical noon sky. Others are built to withstand extremely low temperatures, vibration, shock and many other abuses to which they are subjected.

On planes, for example, numerous fractional-horsepower motors are used but the standard industrial motor is not suitable for this service. New records in low weight per horsepower had to be achieved involving extensive changes in design and production.

To prevent the light from instrument panels from impairing the vision of night fighters, ultra-violet radiation which activates fluorescent instrument dials was developed. As a result, the pilot may look out into the darkness after reading his instruments without the least effect on his eyes. How many precious air victories can be credited to this one development alone?

But, in general, the story of this industry's war work is much too blurred by military censorship to afford an adequate picture of its contributions. The factories and shipyards that are turning out war materiel tell a more complete story. Many of these have been built during the past two years. Others have gone through a complete conversion process. In every case, large quantities of electrical materials were involved.

In the broadest sense, there are three major jobs which this industry has had to do, in addition to equipping our modern war machine. It has had to supply materials for the vast expansion of our industrial system, keep every plant fully maintained, and provide the necessary equipment for the vital power and communication fields.

More than $1,900,000,000 was spent for new industrial construction in 1942, and of this about 7% or $140,000,000 was for electrical materials. New machine tools and other production equipment required an additional $350,000,000 worth of electrical products. The conversion program called for another $145,000,000 of electrical apparatus and supplies.

This total of over $600,000,000 in itself would have staggered the electrical industry in a peace-time year. Yet, this record-breaking production was essential and had to be superimposed upon the direct requirements of the Army and Navy.

Industry depends upon electricity. Consider for a moment the effect of modern lighting upon war production. Industry enjoys levels of illumination and color quality that were undreamed of ten years ago. As a result, midnight shifts operate at daytime efficiency. As a matter of fact, many of the more modern plants have no windows at all.

Then there is maintenance. The failure of one single motor or feeder will stop a production line. Electrical manufacturers have had to stand at all times ready to supply the heavy demand for the maintenance and repair parts that keep our industrial machine operating at top speed. Excess loads, 24-hour schedules and inexperienced production hands combine to shorten the lives of electrical equipment.

Electrical manufacturers have had to supply the greatly expanded needs of our power and communication systems.

New construction of all sorts – war plants, cantonments, war housing – has created a formidable need for additional capacity. Every element in our domestic economy has called for increased communication and power services. All this had to be superimposed upon the vast demands of our armed forces. The magnitude of this task is obvious but it is being successfully accomplished. Every old installation is functioning smoothly and every new one has been ready to function on exact schedule. There has been no failure either in our power or in our communication. Part of the credit for this performance belongs to the hundreds of manufacturers who delivered their products when and where they were needed.

This was not merely a problem of increasing production. These manufacturers had been depending on rubber, copper, aluminum and steel – all highly critical materials. For much of their non-military production they suddenly had either to find substitutes or practice the utmost economy and ingenuity.

Solutions to many problems were quickly found. Lighting manufacturers greatly reduced their use of steel by designing efficient, non-metallic reflectors. Wire and cable manufacturers expanded their use of synthetic insulation in place of rubber and they promoted the use of higher distribution voltages so that every ounce of copper would work more efficiently.

Steel is essential in apparatus that operates magnetically. There is no known substitute. But marked economies in its use have been achieved through the development of new alloys that are of increased magnetic efficiency. As a result, motors and transformers now consume substantially less steel than did units of equal capacity a year or two ago.

Electrical manufacturers have given our industries numerous new production tools. Infra-red heating tunnels, for example, have drastically reduced the time involved in production drying . . . in some cases from hours to minutes. High-frequency induction-heating has been spectacularly successful in the forging, brazing, hardening and casting of ordnance. Modern welding equipment makes possible speedy production with inexperienced labor.

America's production lines are being patrolled by electrical devices which eliminate human error. One million volt X-ray equipment looks through castings and points an unfailing finger at defects. An electronic flaw detector tests nonferrous drawn-metal tubing for imperfections. Other electronic devices are counting and sorting the products of thousands of war plants. Precision controls regulate all sorts of processes, from aluminum production to armor plate annealing.

These are but a few of many examples of the way in which the magic power of electricity has been harnessed to the war effort. Back of every development there is at least one electrical manufacturer – more often many – who have pooled ideas and methods with no thought of royalties or dispute over cost allocation.

No story of the electrical industry would be complete that did not pay tribute to those manufacturers who have dropped their normal lines in order to produce special war products. Many appliance manufacturers fall in this group. When war came, they did not stop to argue that civilian morale and big pay checks would demand a continued supply of their products, instead they quickly shifted to the production of war materiel and today they are deep in the manufacture of machine gun parts, aircraft sub-assemblies, and even gas-mask fabric. They have had to abandon their hard-won markets for the duration; but they are contributing mightily to permanent peace and a more prosperous world to which they will return when the guns are silenced.

This great industry has increased its production three fold in two years – $2,500,000,000 in 1940 to $7,500,000,000 in 1942. It has done this with all the zest of youth, for this is a young and a pioneering industry. Few companies in this industry are fifty years old; the majority are much younger. Top management, in general, is young, too, and many outstanding technical developments have come from the brains of men just a few years out of college.

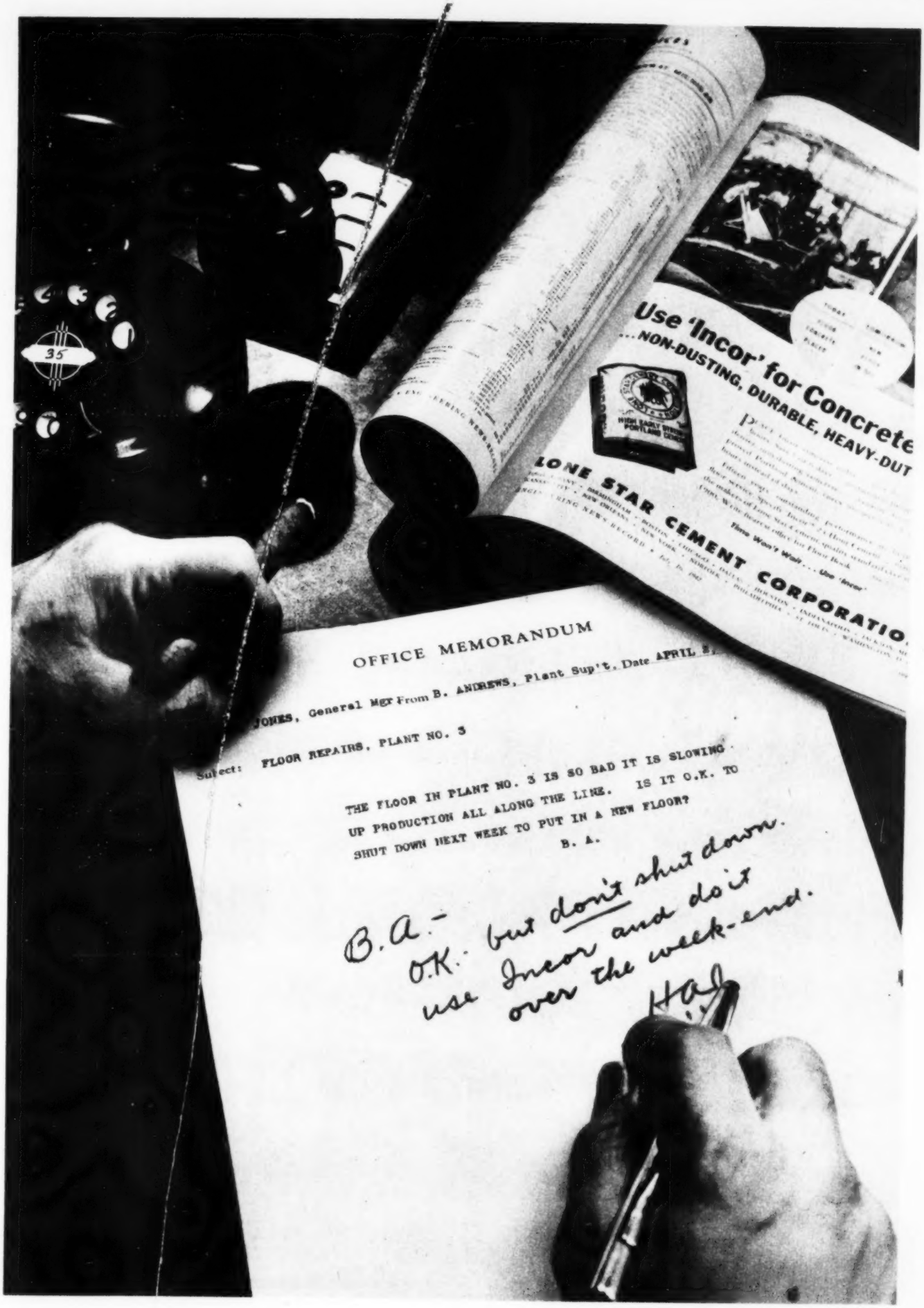
The results of all its intensive intelligent work can be found in every factory, on every battlefield and ocean, and even in the flak-spotted air over Berlin. In a sense, the electrical manufacturing industry stands beside every soldier and every sailor as he goes into action. It has a place of honor it richly deserves.

And when this war passes into history, as it surely will, our soldiers and sailors returning to peace-time jobs, will find a life greatly enriched by electrical developments that were undreamed of yesterday.

This is the twelfth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.


Use 'Incor' for Concrete
...NON-DUSTING, DURABLE, HEAVY-DUT
LONE STAR CEMENT CORPORATIO
OFFICE MEMORANDUM
JONES, General Mgr From B. ANDREWS, Plant Sup't. Date APRIL
Subject: FLOOR REPAIRS, PLANT NO. 3
THE FLOOR IN PLANT NO. 3 IS SO BAD IT IS SLOWING
UP PRODUCTION ALL ALONG THE LINE. IS IT O.K. TO
SHUT DOWN NEXT WEEK TO PUT IN A NEW FLOOR?
B. A.
B.A.-
O.K. but don't shut down.
use Incor and do it
over the week-end.
H.J.

OSGOOD

recommends the continued purchase of War Bonds and Stamps—and the observance of preventative maintenance to keep your machinery running.

OSGOOD AIR CONTROL

the smooth, velvety, effortless control force with the operating ease and efficiency of steam. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing.

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GENERAL
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OSGOOD

Shovels
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THE OSGOOD COMPANY, Marion, Ohio

HELP *for* "GREEN HANDS"

● The shortage of experienced maintenance men may mean more idle equipment time unless your "green hands" are given adequate instruction. Improper lubrication and the lack of regular servicing not only shortens the operating life of equipment, but results in breakdowns and loss of productive capacity that could be avoided.

If your lubrication men have not been provided with the information they need to properly care for Rear-Dump or Bottom-Dump EUCLIDS, write our Service Department for Lubrication Charts and Schedules. For Model F Rear-Dump EUCLIDS request Form INS-165; Bottom-Dump Euclid lubrication data is contained in Forms INS-162 and INS-172.

The EUCLID ROAD MACHINERY Co.
CLEVELAND OHIO

The loading view at the top of the page shows a Rear-Dump EUCLID on a Naval Training Base job. Other views down the page show a Euclid dumping iron ore into a hopper; part of a large fleet of Bottom-Dump EUCLIDS being loaded by an elevating grader at a southern air base; and grading work on a large air training field.

EUCLID

THIS "Cat" and "Carrimor" rig is rushing work on a 1,500,000 cu. yd. job of clearing, filling, leveling virgin acreage for the use of flying personnel for our Armed Forces. This job is typical of the many kinds of war construction work being performed with speed and skill by modern earth-moving equipment.

To assure long life and a minimum of service interruptions not only of "Cats" and "Carrimors," but of trucks, shovels, bulldozers, and other equipment, contractors everywhere are lubricating the bearings of their equipment with *Texaco Marfak*.

Texaco Marfak provides a tough, adhesive-cohesive film that clings to metal, resisting the severest rain and road splash.

The reason behind *Marfak's* longer-lasting protection is this – while it liquefies inside a bearing, providing liquid film lubrication, it maintains its original consistency at the outer edges, thus sealing itself in while sealing out dirt, grit, water.

For wheel bearings, use *Texaco Marfak Heavy Duty*. It stays in the bearings – off the brakes – winter and summer.

So effective have Texaco lubricants proved that they are definitely preferred in many other important fields, a few of which are listed opposite.

A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York, N. Y.

TEXACO

TEXACO

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT – CBS

LANDING TOMORROW

THEY PREFER TEXACO

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

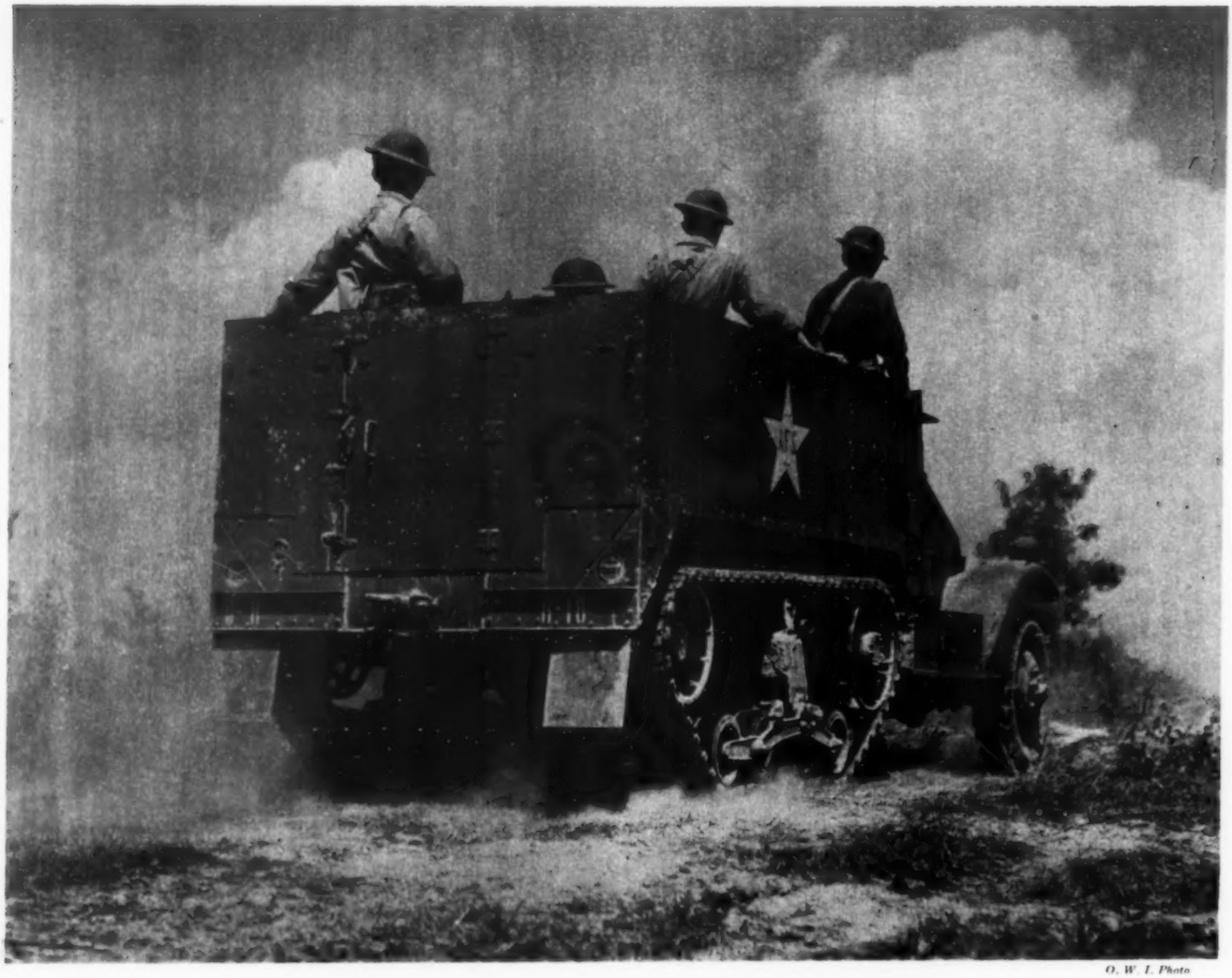
★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated and fueled with Texaco than with any other brand.

MARFAK

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



O. W. I. Photo

Track of All Trades —and Master of All

A typical example of B. F. Goodrich development in rubber

THE endless band rubber track you see on this army scout car started out on a farm tractor. It was 'way back in 1931 that B. F. Goodrich was the first to develop rubber tracks for slow-moving agricultural tractors.

Now this track is being used on vehicles designed for fifty-eight different military purposes! It makes possible deadly tank destroyers, fast scout cars, gun carriers, and other combat vehicles. It's truly a "track of all trades" —and master of all, for the fast, sure maneuverability of the half-track units is one of the great military advancements of this war.

In between the first track and those of today was one of the most intensive research and development programs ever undertaken by The B. F. Goodrich Company. It was carried through in cooperation with the U. S. Army Ordnance Department and climaxed with the announcement that these tracks are now to be made with substantial amounts of synthetic rubber. Compounds using synthetic rubber have proved equal in wear resistance to natural rubber.

Rubber tracks enable vehicles to travel cross-country at highway speeds, to cross ditches and streams, to travel through mud or sand that would stop a pneumatic-tired vehicle.

Called "square tires" by some, this continuous band track, in which are embedded steel cables, resists wear on roads and cutting on rock and actually saves almost 500 pounds of rubber per vehicle as compared with the use of combat tires.

Today this great development, another "first" for B. F. Goodrich, is helping to win battles—tomorrow, through peacetime applications on farms and in factories, we hope it will help win the peace.

SPEEDING UP U. S. NAVY AIRPORT CONSTRUCTION

HERE one mile equals fifteen. This Normal Duty Barber-Greene Mixer is mixing sand asphalt for runways over 300 feet wide and 6" thick. There's a big job to be done, and the Barber-Greene is doing it with speed, economy, and perfection. Rated at 1¼ to 1¾ yards per minute in the B-G Catalog, this Normal Duty Model 848 is consistently mixing 3 cubic yards per minute of loose material on this job, not only speeding up construction, but meeting rigid Navy inspection.

Its ability to handle any bituminous or stabilizing job, in either Travel or Central Plant operation, its portability, high capacity, and thoroughly earned reputation for accurate proportioning and thorough mixing deserve your investigation. The B-G Mixer Book explains and illustrates its many outstanding features. Write for your copy. There is no obligation.

40-14

BARBER-GREENE

GOING PLACES

This howitzer packs a knock-out wallop that will hasten the day of victory.

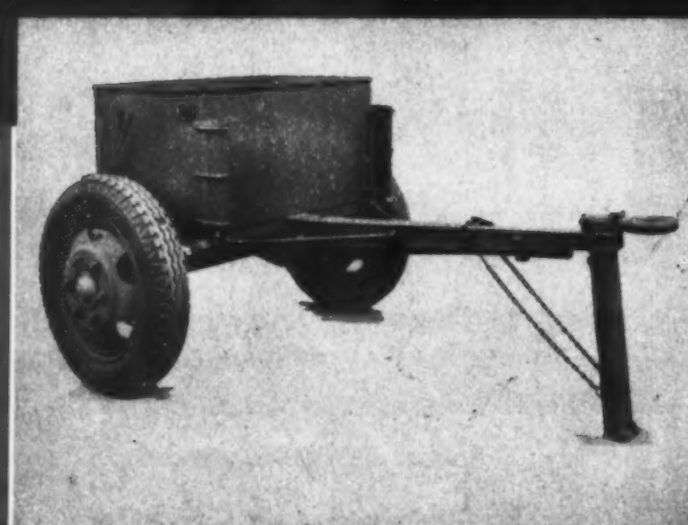
● ON THIS PAGE . . . weapons of war; produced in ever larger quantities, and "going places" where they can be used most effectively.

ON THE OPPOSITE PAGE . . . peacetime products; now "doing things" in a war effort that stretches around the globe.

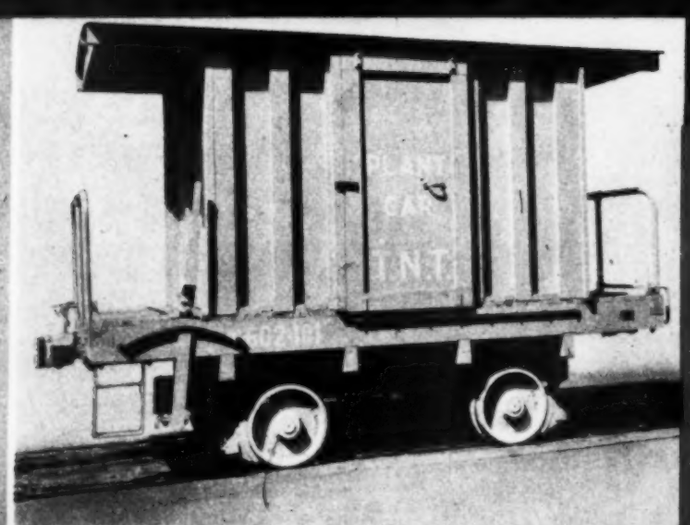
Behind both types of product are engineering research, topnotch manufacturing facilities and trained craftsmen, equally skilled in producing equipment of highest quality, for war or peace.

THE AUSTIN-WESTERN ROAD MACHINERY CO., AURORA, ILLINOIS, U. S. A.

Hundreds of these Aurora-built caissons are serving our artillery in far-flung corners of the world.

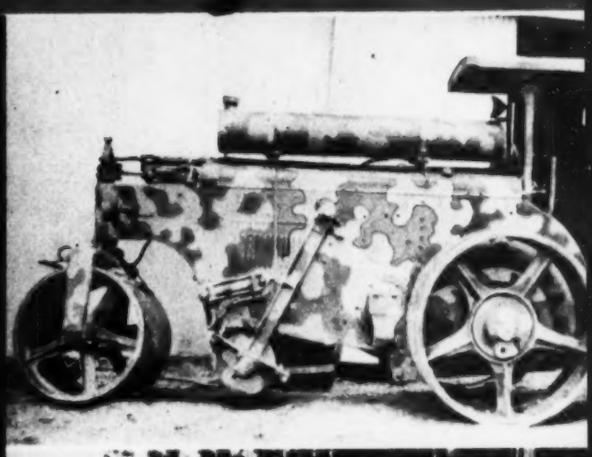


Designed especially for handling TNT, there is almost no metal in this car. Even the brake shoes are wood.

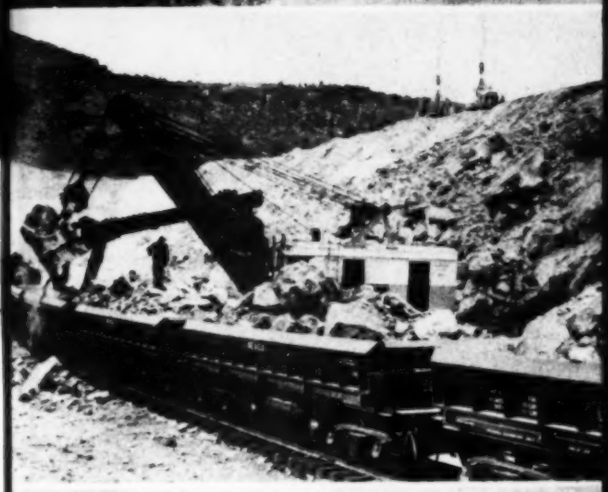


Doing Things!

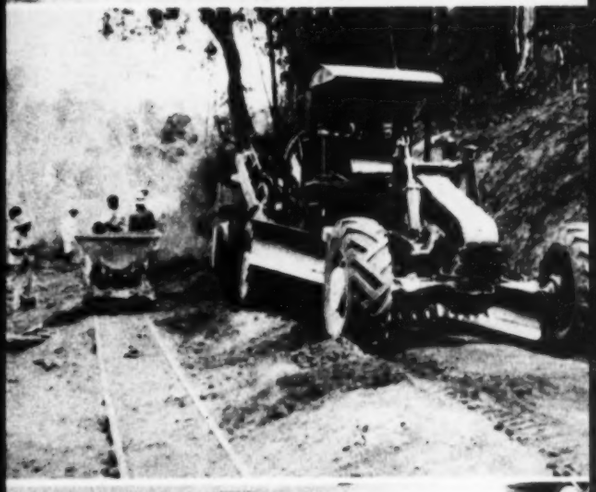
← The 99-M Power Grader, with its exclusive All-Wheel Drive and Steer, is ideal for airport construction, or wherever power and traction are at a premium.



→ The good job of camouflage will help this Cadet Roller stay on its job at a Caribbean base.



← The famous "WESTERN" Dump Cars and Trail Cars are playing an important part in the rush hauling of ore, and other strategic raw materials.



→ This 99-M Power Grader, with Loader Attachment, is opening the route to strategic ore deposits in the heart of the South American jungle.

← Thousands of tons of gravel are being turned out at a Navy ammunition dump by this Twin-Unit Crushing Plant.

→ Hundreds of Patrol Sweepers are keeping runways and aprons clean and safe, at air bases and airplane factories.

BUILDERS OF ROAD MACHINERY

Austin-Western

SINCE 1859

The Austin-Western Line includes POWER GRADERS, ROAD GRADERS, ELEVATING GRADERS, ROAD ROLLERS, SHOVELS AND CRANES, STREET SWEEPERS, DUMP CARS, TRAIL CARS AND A COMPLETE LINE OF ROCK CRUSHING AND SCREENING PLANTS.

Fast, Strong Foundations for American Industry at War

MONOTUBES..

FOR years, job-wise engineers and construction men have preferred Union Metal tapered Monotubes for the fast, sure, easy and economical installation of cast-in-place concrete piling.

Monotubes have been used successfully in the construction of bridges, buildings, highways and underpasses in 34 States of the Union and in foreign countries.

Today, because we, like you, are devoting all of our efforts to the Nation's drive for victory, Monotubes are produced only for the construction of war plants and other essential war projects.

But tomorrow, when the victory is ours, Monotubes once again will be available to everyone in any quantity —for sounder, more lasting foundations.

Remember these special Monotube features if you're building for war production *today,* or planning peacetime projects for *tomorrow:*

SPEEDY Handling. Monotube steel casings are light in weight for fast and economical handling.

SPEEDY Driving. Tapered Monotubes are so strong and rigid they require no heavy core or mandrel and can be driven with average job equipment.

SPEEDY Extension. Extendible Monotubes permit installation of varying pile lengths on the job without delay or waste, even in low headroom.

SPEEDY Inspection. Tubular design permits fast, thorough inspection, top to toe, before concreting.

Available in a gauge, size and taper to meet all requirements. Catalog 68A, free on request, gives complete details. Write for your copy.

ARMY E NAVY

UNION METAL

THE UNION METAL MANUFACTURING COMPANY · *Canton, Ohio*

Careful operators know how to get the last ounce of work out of a wire line. But nowadays many inexperienced operators are on the job, and this means superintendents must take pains to train and supervise.

To help superintendents, foremen, and operators get the most service out of their wire rope between replacement, Hazard has prepared a constructive 80-page pocket-sized manual entitled *"How to Keep Your Wire Rope Working."* This booklet is *not* an advertisement. It does not contain a single trade name. But it's packed with practical ideas and basic information of value to all who work with wire rope, experienced men as well as inexperienced. Write for your copy today.

HAZARD WIRE ROPE DIVISION
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Fort Worth, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma
AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT, CONNECTICUT

HAZARD LAY·SET Preformed WIRE ROPE

CONCRETE HELPS THE "IRON HORSE" IN THIS WAR OF MOVEMENT

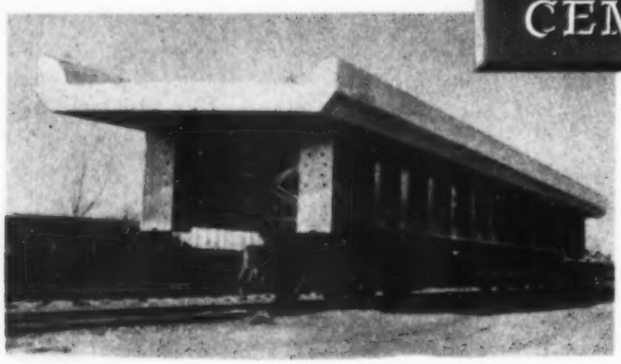
The railroads carry our fighting tanks

Lehigh CEMENT

Never in America's history have our railroads been so busy on so big a job. This is truly a *war of movement* . . . on Home Front and Fighting Front alike.

Naturally, even the sturdy "Iron Horse" needs help from other Industries. Concrete, in many cases made with Lehigh Cements, was used to build bridges, culverts, loading platforms, piers, and freight sheds.

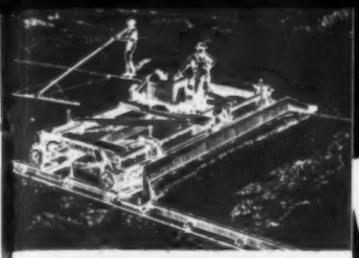
When installations were needed in a hurry, Lehigh Early Strength Cement often got the call . . . because it can provide denser, finer concrete in ⅓ to ⅕ of normal curing time. The Lehigh Service Department will supply you with full details and advice.



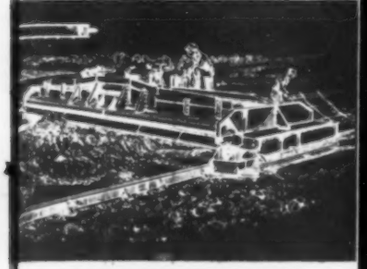
Five complete track sections were constructed on flat cars, moved to the job, lifted and set into place. Lehigh Early Strength Cement made concrete for decks and aprons. Although poured in cold weather, concrete was ready to receive roadbed, ties and rails in 72 hours.

LEHIGH EARLY STRENGTH CEMENT
FOR **SERVICE-STRENGTH** CONCRETE IN A **HURRY**

LEHIGH PORTLAND CEMENT COMPANY • ALLENTOWN, PA. . . . . CHICAGO, ILL. . . . . SPOKANE, WASH.



FINISHING MACHINES FOR CONCRETE AIRPORT PAVING



CONCRETE SPREADERS FOR AIRPORT PAVING

ROAD FORMS FOR AIRPORT PAVING

TRUCK MIXER LOADING PLANTS

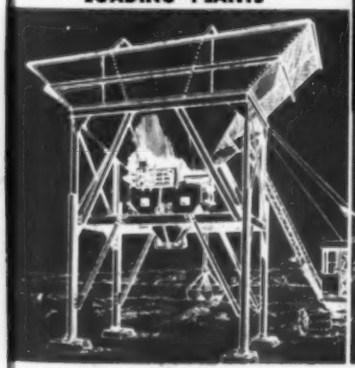
GHQ

for dependable Construction Equipment

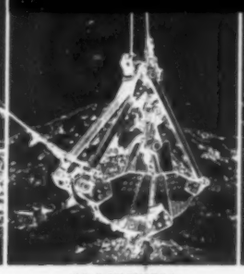
America's construction forces need reliable and familiar equipment to do the big hurry-up job of building air bases, roads, depots, docks, etc, for the Army and Navy—so, as a matter of course, they took Blaw-Knox Construction Equipment along to the wars.

Our construction battalions throughout the world are guided by men who know from experience the dependability of Blaw-Knox equipment.

Every effort is being made by Blaw-Knox to supply the military requirements for construction machinery—to help build for victory.

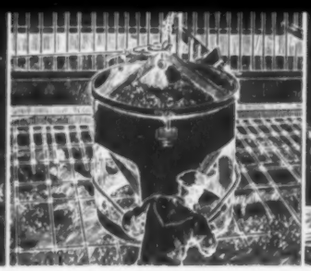


AGGREGATE BATCHING PLANTS

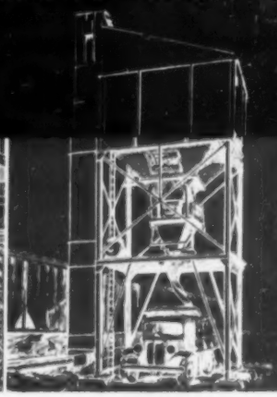


CLAMSHELL BUCKETS

TAMPING ROLLERS



CONCRETE BUCKETS



BULK CEMENT PLANTS

BLAW-KNOX

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OF BLAW-KNOX COMPANY
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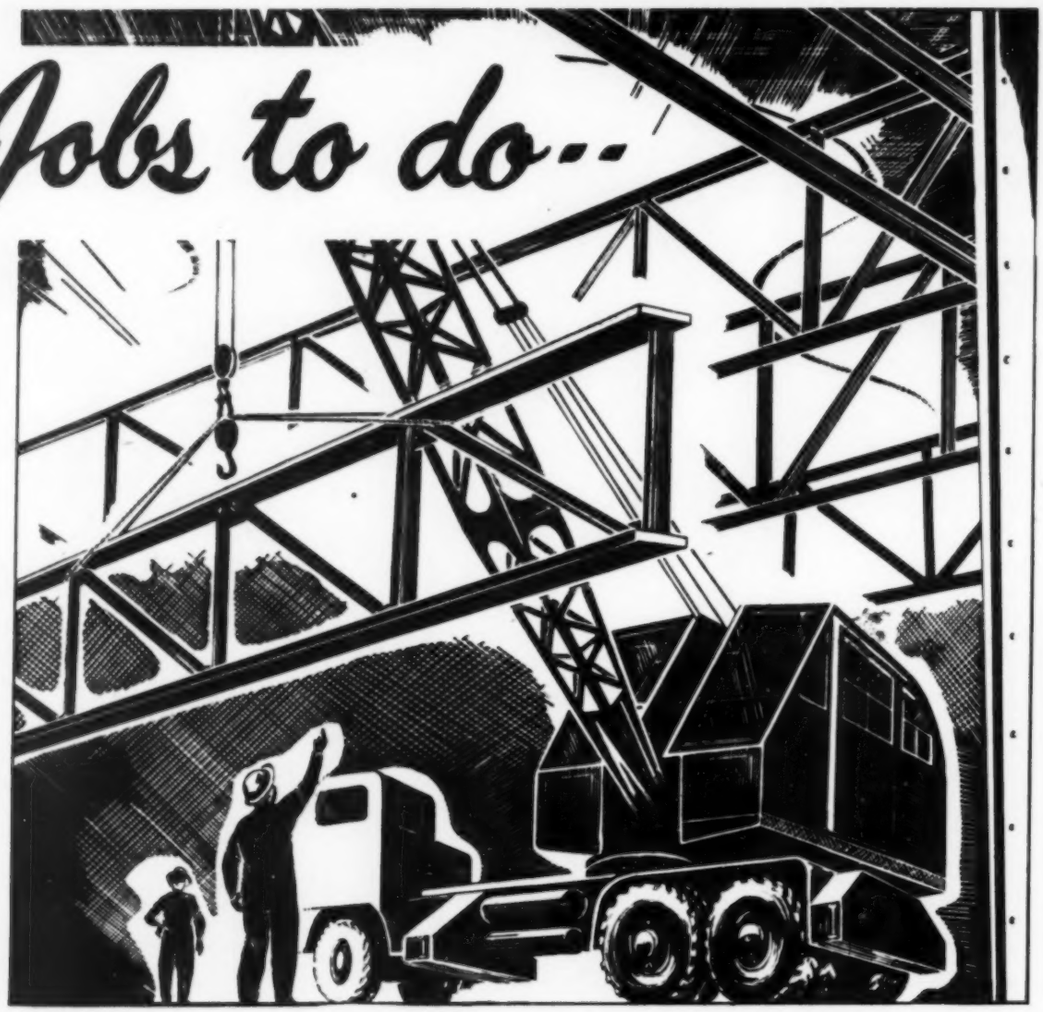
★ ★ ★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★ ★

Big Jobs to do...



Calling for Mobility and Stamina . .

Construction—earth moving—trenching—loading; these and countless other tasks are labeled, "NOW"! United Nations' engineers are winning lasting fame for "doing-the-impossible"—and along with other equipment the mighty MICHIGAN Dual Tandem-drive Crane is playing its part. Today, military battles are won by highly MOBILE units with STAMINA to give them staying power — the same two factors that have long been featured in MICHIGAN Shovels and Cranes. Fighters now, these MICHIGANS will be equally important in the vast peace-time construction program after V-day.

Write for Bulletin CM-63 and specifications.

AIR CONTROLLED

MICHIGAN

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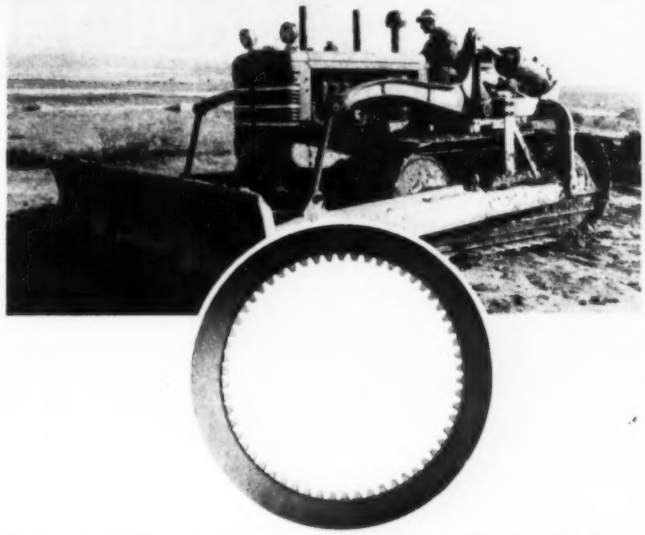
BENTON HARBOR, MICHIGAN

Velvetouch



PROVEN FOR YOU AT 30,000 FT.

Higher and higher go America's combat planes, as engine superchargers become more powerful and reliable. Operating at speeds up to 24,000 r.p.m., the 2-stage geared superchargers are equipped with VELVETOUCH clutch facings. This amazing friction material has also proven its dependability in landing wheel brakes and in clutches on bomb doors, wing flap controls and gun turret mechanisms. Such established performance, under the most severe conditions, makes VELVETOUCH the logical choice for clutch facings and brake linings in tractors, trucks, shovels, power take-off units and other earth-moving equipment. Specify VELVETOUCH for long wear and trouble-free operation!

MORE WORK PER DAY WITH "VELVETOUCH"

VELVETOUCH is an all-metal friction material—a combination of sintered powdered metals, compressed and welded to a solid metal backing. The internal tooth type steering clutch disc (15" OD) for crawler type tractors gives long, dependable service . . . does not jerk, chatter or slip . . . requires few adjustments. VELVETOUCH enables men and equipment to do the job faster.

TRADE MARK REG. U. S. PAT. OFF.

Velvetouch

THE S. K. WELLMAN CO.

1374 EAST 51ST STREET
CLEVELAND, OHIO, U.S.A.

PIONEERS IN PUTTING POWDER METALLURGY TO WORK FOR INDUSTRY

Shock Loads Sabotage Wire Rope

(This is Number 15 in a series of informative articles on the conservation of wire rope. The previous article, Number 14, discussed the "Breaking-In Period" of wire rope. The present article endeavors to show how wire rope will last longer if shock loads are avoided after proper breaking in.)

* * *

LET'S AVOID SHOCK LOADS

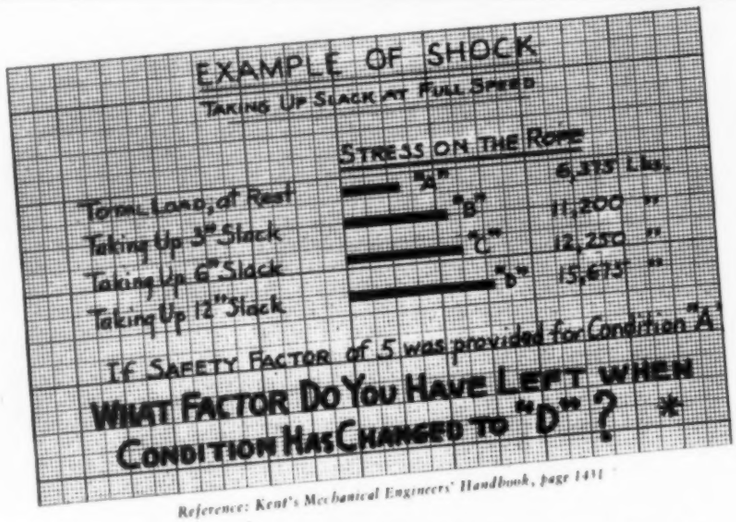
How simple things would be if there were no "ups and downs" in life. Take wire rope as an example. If operating conditions for your rope were always "peaches and cream"... if you didn't have to accelerate or speed up to meet performance expectations... if nothing went wrong to throw unexpected stresses on wire rope... if there weren't any "ifs," what a lot of unexplained things that now happen to wire rope we would never see.

But wire rope will continue to meet unexpected and unforeseen stresses. Knowing that, let's avoid *shock* loads that obviously overstress the rope.

WHAT ARE SHOCK LOADS?

Wire ropes are made to a specified catalog breaking strength. All hoisting equipment is designed with a predetermined line pull or load at drum for loads the equipment is made to handle. *Any load above the normal working load can develop a shock load.* And shock loads today are very definitely saboteurs of the war program.

Look, for example, at the chart. There you see what happens when a given load is applied suddenly to a slack rope. The given load (in this case 6,375 lbs.) remains the same BUT the sudden impact to the rope the second that slack is taken up creates a shock load that may exceed the rope's elastic limit. The result may not be an immediate break, but, because the rope is overstressed, it often fails on another operating shift, with another operator, who does not know about the overstressed condition of the rope. When the slack to be taken up is 12", for instance, the stress on the rope *at impact* is 15,675 lbs. . . . or more than twice the total load at rest.



Reference: Kent's Mechanical Engineers' Handbook, page 1431

ANSWER: *6,375 x 5 = 31,875 lbs. B. S.
31,875 ÷ 15,675 = 2.03 Factor of Safety

MONARCH Whyte Strand PRE-FORMED WIRE ROPE

. . . Macwhyte premier wire rope, famous for its strength, toughness, and internal lubrication.

DOESN'T SAFETY FACTOR ABSORB SHOCK LOADS?

Safety factors for wire ropes vary with the type of equipment and use, as explained in article Number 4 of this series. Safety factors are based upon standard normal operations and cannot absorb the excessive shock loads, because these are beyond the normal working loads upon which the safety factor is figured.

HOW CAN YOU AVOID SHOCK LOADS?

1. Make sure there is no slack and no jerking of the rope at the start of loading.
2. Watch carefully the loads hoisted to see that they are not beyond the rope's proper working load.
3. Do not allow rope to become fouled or jammed either on the drum or by jumping a sheave.
4. Start load carefully — too fast acceleration overloads the rope. Watch how the rope "takes it" on the pick-up. Apply power smoothly and steadily.

OPERATOR ALL IMPORTANT!

Provided the equipment is in good condition and the correct rope is properly installed, the responsibility lies squarely on the operator to avoid shock loads. A good operator is a good rope's best friend, and when this friendship ceases, the rope might just as well be cut up with a torch or emery wheel. An operator can "make or break" a wire rope. There is no substitute for experience in handling rope and a desire to get the most out of it.

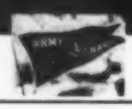
ALL 15 ARTICLES AVAILABLE ON REQUEST

For the benefit of those who want helpful information on how to conserve their wire rope, Macwhyte Company, its distributors, or mill depots will gladly send a set of all articles when requested on your letterhead.

NO. 680

MACWHYTE COMPANY

WIRE ROPE



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Manufacturers of MACWHYTE PREformed and Internally Lubricated Wire Rope MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Rope MACWHYTE Braided Wire Rope Slings MACWHYTE Aircraft Cables and Tie-Rods

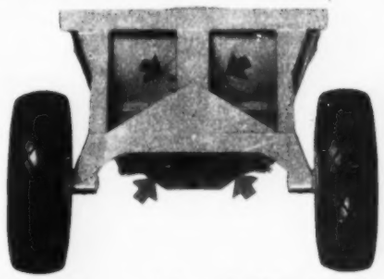
Here's How
The Heil Bottom Dump Trailer Wagon
Sets New Records

for Speed and Hourly Production

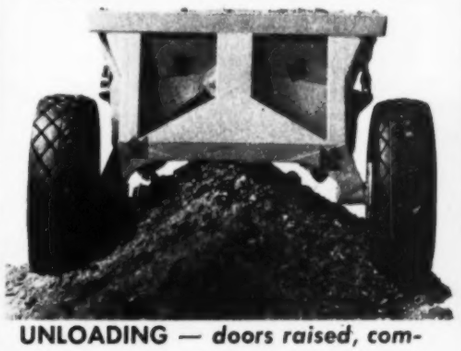
Heil engineers achieved this remarkable result by making new use of two old, proved principles of design — the clamshell principle, and cable control. The familiar clamshell is *opened* by power, *swings closed* by gravity. The operator dumps his load all at once or a little at a time, as he prefers — under complete control. And that is *exactly* what he does with this new Heil unit — the wagon that spreads like a cable scraper, that turns at will off the windrow because there are no doors dragging in the dirt, that dumps in 2 seconds and pulls away in a flash. High-clearance doors interlocked, completely synchronized, fast and positive in action. Heil Cable Scraper interchangeable on the same power unit. Investigate! Plan now for the bonus performance that makes you a stand-out against any competition. Write for bulletin.

R-11

New, revolutionary clamshell-type bottom-dump doors-power-opened



LOADED — *"clamshell" closed*



UNLOADING — *doors raised, completely clear of the dumped load*

Dumping clearance of 35 inches with doors wide open! Doors operate on trunions *outside* the hopper body. When the dumping doors are pulled open by cable power, the doors *swing up alongside the hopper* — out of the way. (Minimum clearance with doors *closed*, 26"; rear axle clearance, 39"). Patented construction.

★★★★★

The HEIL Company is engaged in all-out war production for *Victory*

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE, WISCONSIN

This is the

FIRST STEP IN MAKING SYNTHETIC RUBBER!

A LINK-BELT SPEEDER HANDLES MATERIALS THAT WILL BUILD A PLANT

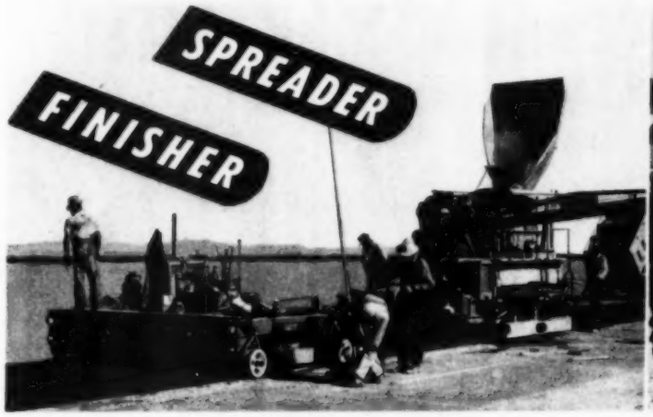
The picture shows a 1½ yard Link-Belt Speeder clam shell feeding a batching plant that supplies 400 yards of ready-mixed concrete each 10-hour day. The concrete is being used in the construction of a giant synthetic rubber plant . . . This is just another example of the vital way in which dependable, trouble-free Link-Belt Speeder Machines are being used to speed up war-time construction work.

LINK-BELT SPEEDER

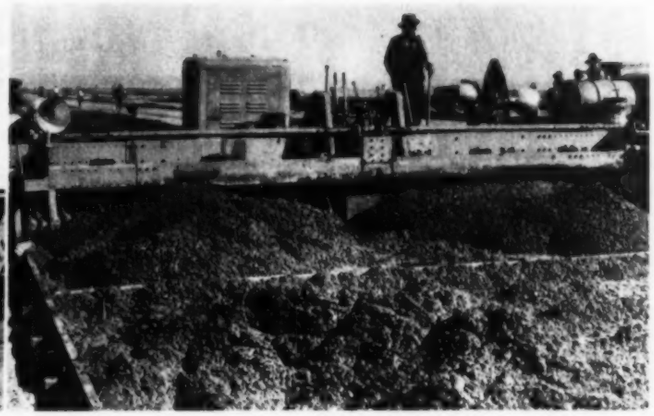
BUILDERS OF THE MOST COMPLETE LINE OF
SHOVELS—
CRANES—
DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
(A DIVISION OF LINK-BELT COMPANY)

JAEGER PAVING TEAMS Have Made It Possible to Build Roads and Airports... *BETTER, FASTER, at LOWER COST*



On 10-12 Ft. Slab



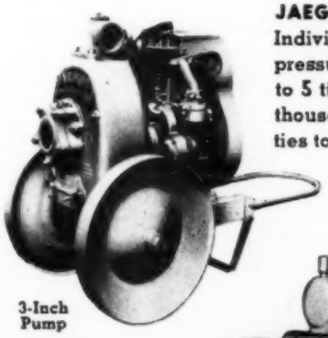
On 25 Ft. Slab

It is a recognized fact that the speed records made in paving concrete military roads and airport runways (exceeding 275 linear ft. per hour on 25 ft. width and 475 ft. per hour on 10 ft. width) have been made possible by the use of the finishing machine and the concrete spreader, both originated and developed by Jaeger-Lakewood engineers.

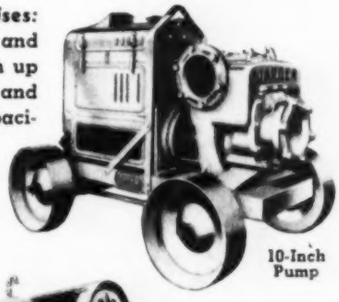
JAEGER RE-MIXING SCREW CONCRETE SPREADER, by replacing hand shovelers, makes it possible to handle and spread the stiffest concrete, as dry as ½" slump, as fast as dual drum or multiple pavers can mix and pour. Re-mixing spreader screw eliminates all segregation, densifies and improves the strength and uniformity of the slab. Single operator spreads the piles, strikes off, ready for final finishing. Also adaptable for spreading and finishing bituminous material.

JAEGER-LAKEWOOD HIGH SPEED FINISHER is the most flexible machine ever developed for finishing dry, stiff concrete at today's fast pace. Transmission in front of engine gives direct lever control of all functions—3 working speeds of 8, 12, 18 ft. per minute and 3 independent screed speeds, all gear-selected, plus unlimited speed range by engine throttle. Hydraulic screed lift, "velvet touch" screeding, 4-5 ft. telescopic width adjustment, many advanced features. Standard and vibratory models.

JAEGER "SURE-PRIME" — *the Pumps that Exceed Their Promises:* Individually factory tested and certified for vacuum, capacity and pressure, regularly exceed their guaranteed performance — with up to 5 times faster automatic priming, big air and water capacity and thousands of extra hours of service. Sizes 1½ to 10 inches — capacities to over 200,000 gallons per hour.



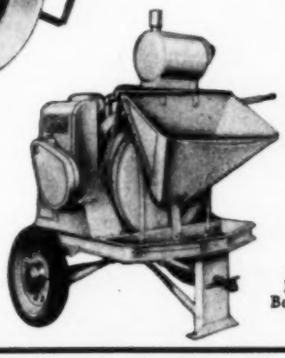
3-Inch Pump



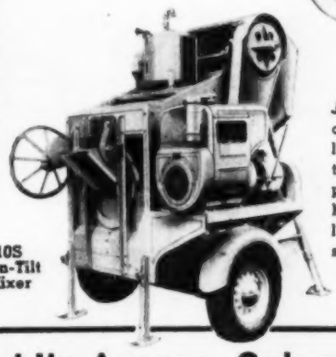
10-Inch Pump

JAEGER PUMPS have patented high-velocity "Priming Jet," high pressure shells of self-cleaning design, replaceable liners, longest-life seal, oversize construction.

JAEGER "SPEEDLINE" MIXERS in sizes up to one-half yard, have machined steel drum tracks, enclosed automotive-type transmission, run more smoothly and quietly. Fastest known loading and discharge. Perfectly balanced, easy to trail and move on Timken bearing wheels, spring shock absorbers.



3½S with Measuring Batch Hopper



10S Non-Tilt Mixer

JAEGER MIXERS are the recognized leader throughout the world—for fast production, easy handling and long life, trouble-free service.

THE JAEGER MACHINE CO.

800 Dublin Avenue, Columbus, Ohio
Service in Over 100 Principal Cities

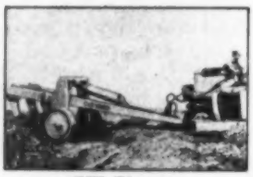
Opening the way to Victory!

with GW Road Machinery

GW Roadbuilders

GW Bulldozers

GW Tamping Rollers



GW Rippers

Write for literature.

GW 2-wheel Scrapers backfilling around culvert

Protect Freedom
BUY
WAR BONDS
for Victory!

GW Road Machinery is playing a highly important role in the winning of our Global War. The mechanized forces of the United Nations rely upon GW Scrapers, Bulldozers, Roadbuilders, Rippers and Tamping Rollers to clear the Way to Victory! Powerful, hydraulically-operated GW War Scrapers slice out chunks of hills, mountains, dig and haul, dump and spread all kinds of terrain, making it possible for faster building of roads, airfields, dams, and other projects, for quick, offensive advancement.

GW Scrapers have the capacity to move tremendous quantities of dirt in a short time by reason of their unique design, hydraulic action and rugged construction. **Only GW Scrapers have all these exclusive features: Spring-Lift for Lifting Load Rapidly When Needed — Integral Pump-Tank-Valve Assembly — Positive Gravity Ejection of Load — Variable Cutting Edge Angle — Power Return for Bowl and Gate — Power Down on Blade — Variable Wheelbase.**

See your nearest Allis-Chalmers Dealer.

OUR ONLY JOB now IS TO WIN THE WAR

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc., Detroit

You can buy a new shirt in 10 minutes . . .

but it may take weeks to replace a scored piston

The answer is Preventive Maintenance now with Shell Diesel Lubricants

SHELL

When a high-speed Diesel overheats and "seizes" you've got trouble on your hands, with a long "time out" while you wait for parts to arrive and repairs to be made. Such delays are bothersome, costly.

Under today's extreme operating conditions, more than usual care should be taken to make sure your Diesels are properly lubricated. This means periodic check-ups made at more frequent intervals. They may take time, yes. But the few minutes they do take will be well spent when you compare them with costly delays such check-ups can save you.

Don't you wait for trouble to remind you that it's time to lubricate. Call in the Shell man now. Let him help you plan your Preventive Maintenance.

SHELL DIESEL LUBRICANTS
AND SHELL "DIESELINE"

WORKING for VICTORY

LIMA CRANES HAVE WHAT IT TAKES TO SPEED UP WAR WORK 6 REASONS WHY –

LIMA LIFTING CRANE HELPING TO SPEED UP THE HANDLING OF VITAL WAR SUPPLIES DESTINED FOR SOME FOREIGN BATTLE FRONT.

1 INDEPENDENT CLUTCHES – LIMA cranes can travel and raise or lower the boom at the same time, or swing, hoist and travel at the same time, or do all four operations simultaneously. Imagine the saving in time and the convenience of such a feature.

2 LARGE DIAMETER DRUMS – Drums are of extra large diameter and are of sufficient width to carry the maximum amount of cable for ordinary length booms. Big drums afford longer cable life.

3 ANTI-FRICTION BEARINGS – To further increase the efficiency of LIMA cranes, all important bearing points, including the drums are equipped with anti-friction bearings.

4 HELICAL CUT GEARS – Helical gears are used throughout the main machinery. This LIMA feature assures quiet operation and long life.

5 FAST, LIVE BOOM HOIST – The boom hoist is so designed that absolute safety is assured when raising or lowering the boom. It is independent of all other motions.

6 EASE OF OPERATION – The clutches and brakes are designed for smooth, easy operation. The clutches are the inside expanding type. The bands are extra wide with the maximum of clutch area, thus affording longer life to the lining and freedom from constant adjustment.

Send for free descriptive bulletins

Buy War Bonds and Stamps

V

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SHOVEL AND CRANE DIVISION
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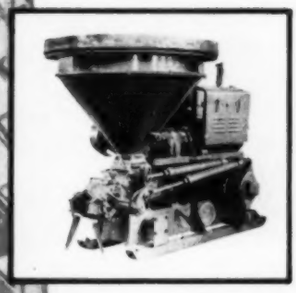
LIMA CRANES SHOVELS DRAGLINES

SHOVELS ¾ YD. TO 3½ YDS. CRANES 13 TONS TO 65 TONS
DRAGLINES - VARIABLE

He DEFEATS GRAVITY in placing concrete



REX Mechanical Engineering—REX M. E.—

likes to start from scratch with new engineering principles and carry them through to development. He did that in developing Pumpcrete—the pump that makes it possible to place concrete by pipe line.

Rex M. E. has given Pumpcrete a long placing range. *The 160 Pumpcrete can pump concrete a horizontal distance of 800 feet, or a vertical height of 100 feet.*

Larger Pumpcretes are capable of forcing concrete *as high as 120 feet or as far as 1200 feet.*

So well did Rex M. E. do his job that today Pumpcrete has become a *standard* piece of concrete-placing equipment. It has successfully lowered costs on jobs *of a few hundred yards,* as well as jobs requiring *several hundred thousand yards.*

Practically all consistencies, from ⅓" to as wet as 10" slump, have been pumped by Pumpcrete with satisfactory results.

To answer the question "Is it a Pumpcrete job?" Rex Pumpcrete specialists have just compiled a 165-page reference manual of Pumpcrete Practice profusely illustrated with photographs and drawings of many styles of Pumpcrete jobs. You can secure a copy—as well as the consulting services of one of these specialists—by writing Chain Belt Company, 1644 West Bruce Street, Milwaukee, Wisconsin.

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Concrete Mixers • Moto-Mixers
Pavers • Mortar and Plaster Mixers
Speed Prime Pumps • Pumpcretes

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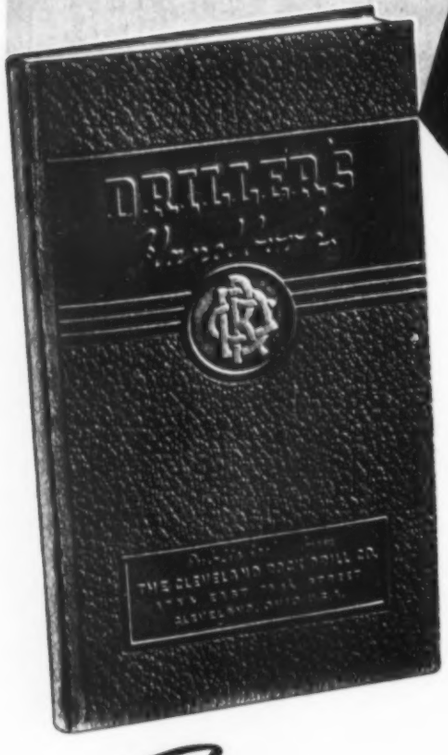
Do You Know . . .

- How to start and run your new drills?
- Why well-oiled drills cut much faster?
- Why worn chucks reduce blowing power?
- How to prevent freezing in cold weather?
- How to remove a scuff or a "pick-up"?
- How to heat-treat shanks and bits?
- What bad shanks do to pistons and chucks?
- How to figure your drilling costs?



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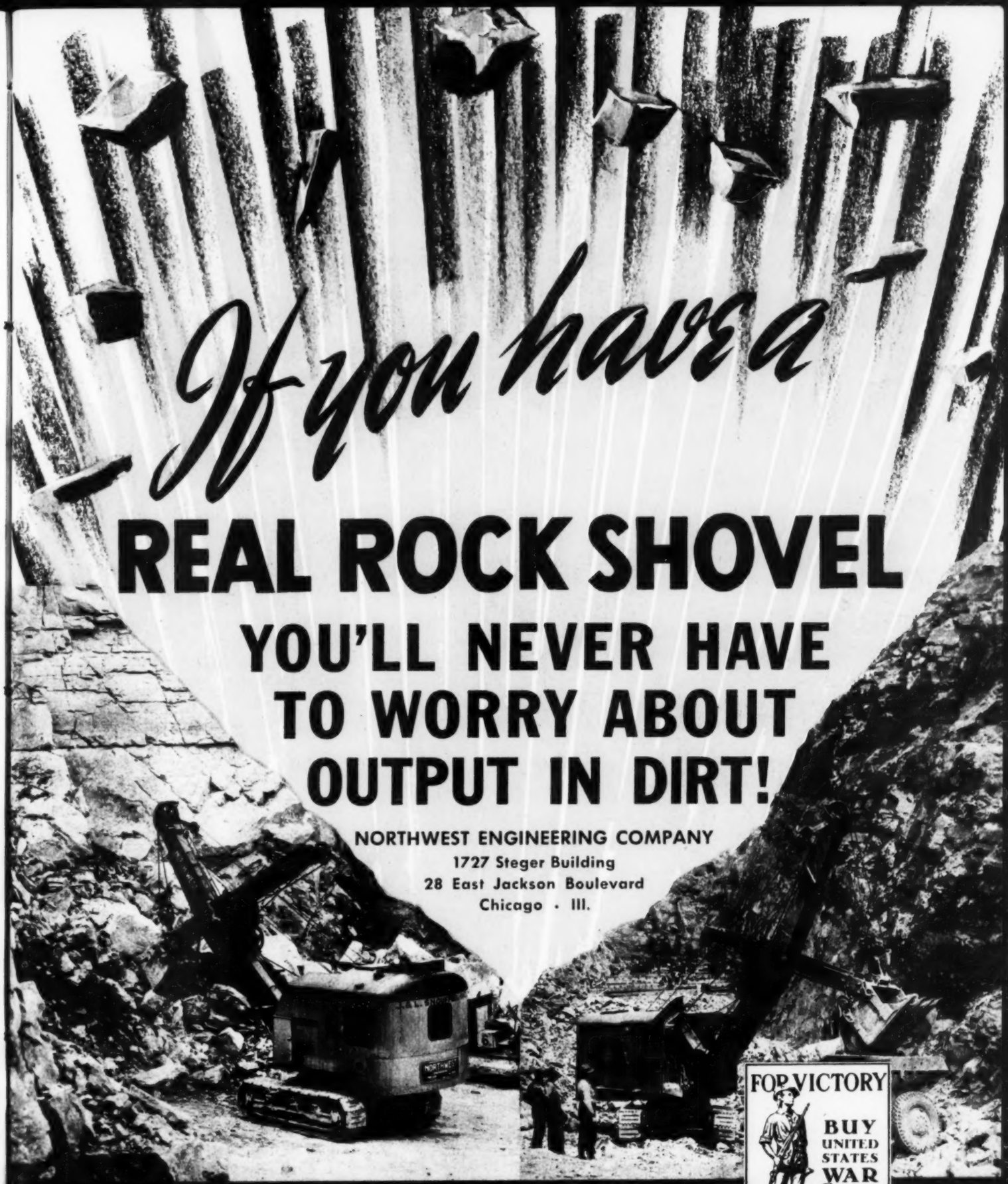
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After VICTORY Buy NORTHWEST

Surprise for YOU-KNOW-WHO...

ROEBLING *"Blue Center"*

helps make it an unpleasant one!

GAINING ACCESS to key points from which our boys with bayonets can prod the Axis rear is a fine art our Corps of Engineers is rehearsing well in advance. Some fine day soon that art will go into action where it really counts. And the you-know-whats who started all this will find that the nation that produced a Francis Marion, a Jeb Stuart, a Cump Sherman, is still producing them—with up-to-date trimmings.

One of those trimmings is the sturdy steel pontoon bridge above, designed to be thrown across water "barriers" in a matter of mere hours. Another is the modern rope-rigged equipment our Engineers use for the throwing. With weapons like these and their "we'll try anything" spirit, those Engineers are ready to go to town. And you know *what* town!

Wherever the going is tough today—at training centers, on maneuvers, at the fighting front—Roebling "Blue Center" Steel Wire Rope is pulling its weight for Victory. Pulling with all the knowledge and skill and pride Roebling engineers and Roebling workers have built into every foot of it.

DON'T LET YOUR ROPES SPRING A SURPRISE ON *YOU!*

YOU CAN FORESTALL it by following a regular inspection and maintenance routine for *all* your ropes. Through such periodic checks, you can stop the *causes* of undue rope wear, keep your ropes on the job for Victory. To make this even easier, Roebling engineers have prepared the handy tag illustrated here, containing a wealth of conservation data to keep your operators and maintenance men reminded of precautions to be observed at all times. Copies of this tag, printed on heavy stock and varnished for easy cleaning, are yours for the asking. Write your nearest Roebling office for your free supply. Ask for Tag "A".

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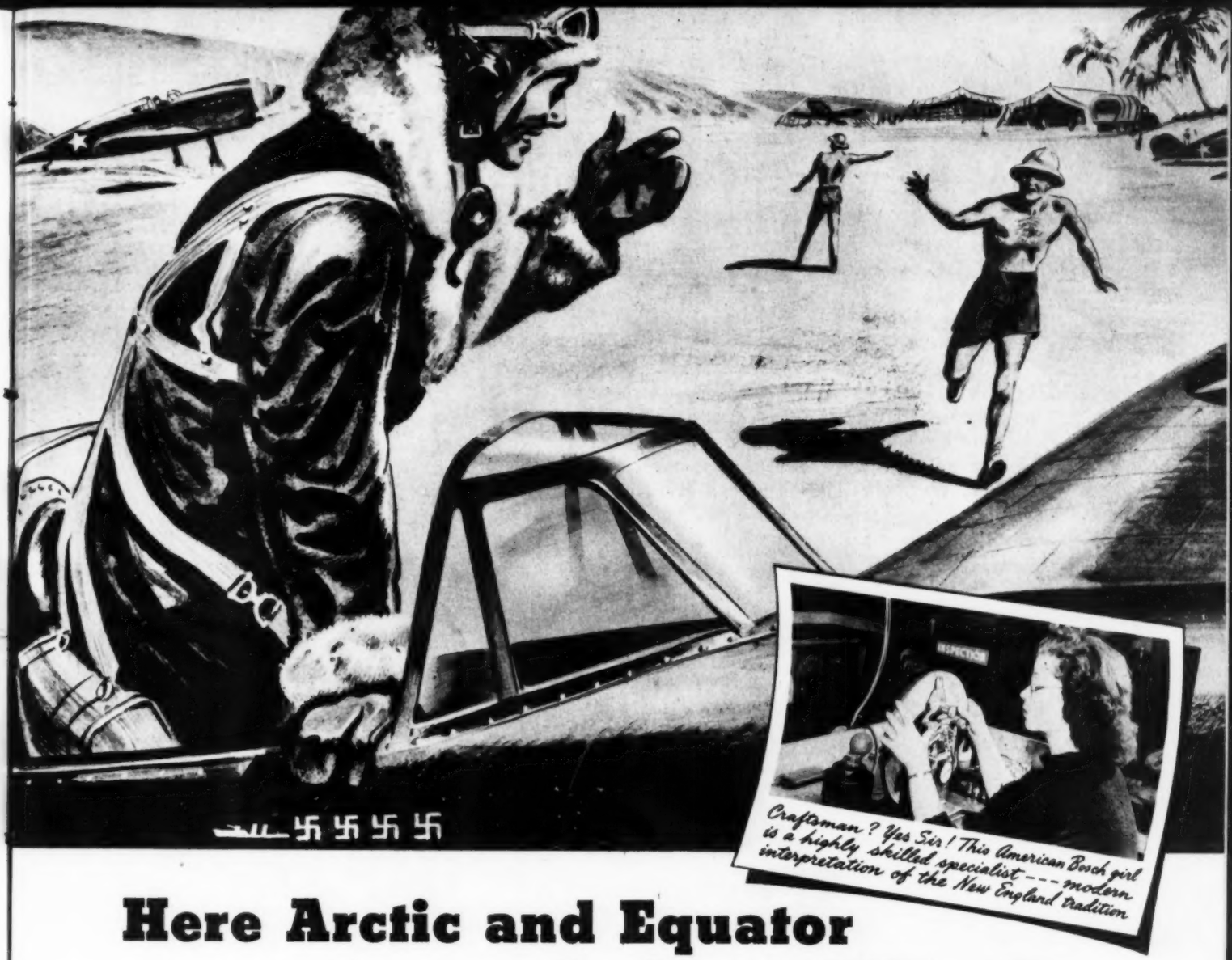


Craftsman? Yes Sir! This American Bosch girl is a highly skilled specialist — modern interpretation of the New England tradition

Here Arctic and Equator are only Seven Miles Apart

American Bosch industrial magnetos are available for essential work in all fields. Perhaps less spectacular than our aviation line, they are engineered to deliver the same dependable, trouble-free performance.

THERE may be only seven miles or so between a plane's service ceiling and the burning desert floor . . . but the temperature spread is as great here as it is between the North Pole and the steaming tropics. That calls for flying equipment that can take the gaff at 70° below and — only minutes later — 150° above.

American Bosch magnetos in U. S. planes are ready to take this punishment from the thermometer; they deliver rich high-tension sparks at the *right* split-second of time . . . now to altitudes far higher than ever before.

Superior American Bosch *design* is backed by similarly superior *production.* Thousands of units move swiftly into service, thanks to our large staff of *specialist* craftsmen . . . many of them relative youngsters who — through engineering, planning, training, and tooling — have gained the skill to do *few* operations *extremely well.* That's the modern American Bosch development of the New England tradition.

In research, design, and production — war or peace — American Bosch serves all branches of the internal combustion engine industry.

AMERICAN BOSCH CORPORATION • SPRINGFIELD, MASSACHUSETTS

AMERICAN BOSCH

AVIATION AND AUTOMOTIVE ELECTRICAL PRODUCTS . . . FUEL INJECTION EQUIPMENT

MODERN CRAFTSMEN IN THE NEW ENGLAND TRADITION

THERMOMETER HITS BOTTOM

-but Airports must be built!

THE miracle of modern machinery is a continuous thing. Time was when the laying of concrete slab at 8°F was one of those things that couldn't be done. But military necessity found a way and a new airport is being completed in spite of the guns of "Old Man Winter."

Man and machine take a real beating in weather like this. The tugging of the intense cold against the high temperatures of the heating equipment impose strains for which road machinery is not built.

But this is just one of the things that MultiFoote Pavers are doing that they never had to do before — one of the many things on which MultiFoote Pavers are proving their metal.

These are the things to remember after the "Duration." Then the smooth operation; the many MultiFoote advantages; the flexibility made possible by the use of elevated booms; the speed and ease of handling, will mean profitable post-war contracts. We will be glad to give you complete details to aid in planning for the future.

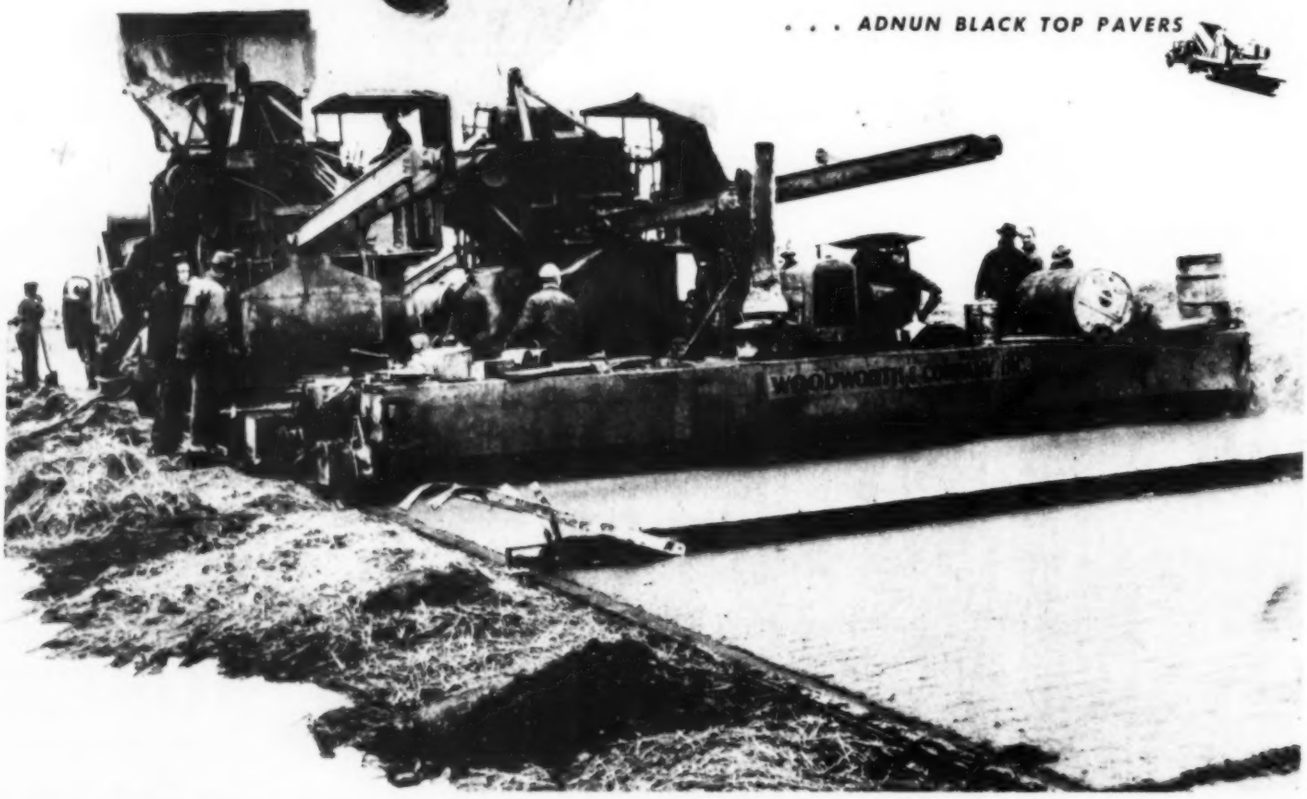
THE FOOTE COMPANY, INC., Nunda, New York

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers.

MULTIFOOTE

CONCRETE PAVERS

. . . ADNUN BLACK TOP PAVERS



YOUR "CATERPILLAR" DEALER

IS HERE TO STAY

NORTH and South, East and West, wherever a free flag flies, the "Caterpillar" dealer organization forms a solid network of service and distribution. The fact that this widespread organization came through the depression years with added strength and efficiency — and that it will come through the present trying period the same way — means much to you as a "Caterpillar" Diesel owner. You know your "Caterpillar" dealer is going to be there when you need him— today, tomorrow or next year.

Your "Caterpillar" dealer is a substantial citizen — a member of the community. He had to have capital, ability and integrity to start in business. And he will stay in it because he has faith in the success of "Caterpillar" Diesel Tractors, Engines and Road Machinery as a sure basis on which to build for the future. He believes that the outstanding record of "Caterpillar" Diesel equipment on the war fronts will build a still greater demand for these machines for the heavy jobs of reconstruction and peace.

He has a real and personal interest in the power users in his territory. He feels responsible for the satisfactory performance of every unit he has ever sold. Today his showroom may be empty of new machines, but you'll find his service department is busier and doing better work than ever.

His men are thoroughly trained for their jobs, many with factory experience. To meet your needs for service he has invested thousands of dollars in special tools, and they are proving their worth today in the maintenance and repair of machines that must stand the punishing pressure of wartime work at home.

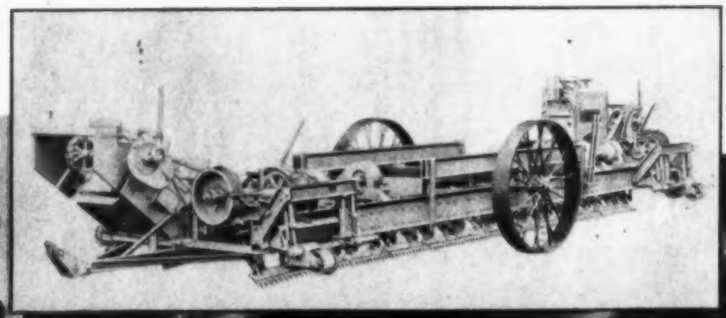
He is making a real contribution to the war effort. Not only do "Caterpillar" Diesel owners depend on him for genuine parts and service, but the Government uses his facilities to keep machines in fighting trim. His modern shop practice enables him to save time and money for owners and to conserve the tons of war-needed metal.

Your "Caterpillar" dealer is the staunchest friend your heavy equipment could have today. Don't hesitate to call on him for honest and expert advice. If you need a new machine for war-essential work, he will help you apply for it. And if you can't obtain a new machine, he will do his utmost to keep your old one running.

CATERPILLAR REG. U.S. PAT. OFF. **DIESEL**

CATERPILLAR TRACTOR CO., PEORIA, ILL. • TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!

HERE'S THE MACHINE...



...that Completes the Paving Picture...

THE R-B Power Finegrader, for fast, accurate preparation of subgrade, steps in and fills a gap in otherwise completely mechanized paving jobs. It performs, among others, these important services:

***Saves Labor**—operated by one man, the Finegrader eliminates nearly all hand labor on the grade.*

***Eliminates Delays**—with the R-B Finegrader, the prepared grade is always well ahead of the paver. On many jobs R-B's have kept out in front of two 34-E pavers, paving as much as 350 lineal ft. per hour.*

***Saves Material**—accurate subgrade reduces loss of yield to a negligible percentage.*

No modern road or runway paving job is complete without an R-B Power Finegrader. Write for bulletin today.

R-B POWER FINEGRADER

BUCKEYE TRACTION DITCHER COMPANY
Findlay • Ohio

Built by Buckeye

These two kinds of wire rope are made in our factory of the same special analysis high carbon steel, the same carefully controlled heat treatment and continuous wire drawing process. As made by our skilled craftsmen both give you plus value.

Yet there is a difference which means money-in-your-pocket. It is this: In ordinary wire rope of any make, the wires are "laid" into position without first being relieved of stresses set up through changing wires from straight to helical or spiraling shapes. Under these unresolved stresses, the wires have a strong tendency to fight each other and will fly apart when the seizing wire is removed. This wasted effort cuts down the resistance to bending fatigue of the rope as a whole.

In *Union-formed* wire rope, the method of helical or spiral shaping the wires in it before they become component parts, entirely frees the rope of shaping stresses. Thus preformed, parts lay in their positions in such perfect repose that they will not fly apart—in fact, often must be pried from position. *Union-formed* wire rope, therefore, utilizes its full stamina for maximum resistance to bending fatigue. That is why *Union-formed* wire rope bends more easily. Every wire and every strand pulls together to wear longer.

This is only one of 10 time-saving, money-in-your-pocket advantages of *Union-formed* wire rope. To the limit permitted under conditions of war, Union is striving to satisfy urgent needs outside of war production.

UNION WIRE ROPE CORPORATION
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IF YOU ARE NOT ON OUR MAILING LIST send for these bulletins: "ROPE DOPE," "Socketing Wire Rope," "Splicing Wire Rope," "Correct Handling of Wire Rope," and "Wire Rope Lubrication." Engineering information supplied without obligation. G-43

Each ★ Represents Another 6 Months of Star Performance

WAR PRODUCTION EXCELLENCE WILL BRING POST WAR PLUS VALUES

union Wire Rope
"THE ULTIMATE IN LOW COST WIRE ROPE"

WHEN YOU NEED PREFORMED WIRE ROPE
SPECIFY **union-formed**

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SPEED PROGRESS OF WET SEWER WORK IN DIFFICULT SOIL

Note soil stratification — impervious clay layers in 15' trench

Note absence of sheeting — 12' of water absorbed by wellpoints

Dry digging is fast—and cheap. A MORETRENCH WELLPOINT SYSTEM on your work is definite assurance that regardless of how difficult soil conditions are or how much water you have, the job will go ahead—IN THE DRY!

A-1 equipment and years of experience on every conceivable type of wet work enable us to *guarantee results.*

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Official U. S. Navy Photograph

A NEST OF *HORNETS* ON THE PROWL

Athey

LOGGING CRUISER WHEELS
FORGED-TRAK TRAILERS
MOBILOADERS

It's likely to mean doom for anything within range when hard-hitting "PT" Boats go into battle.

Basic material for these "sea raiders" is wood—another one of the prime products of war being produced by Athey equipment. In the woods, Athey Logging Cruiser Wheels are the dependable, all-weather answer to getting out bigger production through any footing. And other Athey machines are aiding Victory in other ways.

Sure-footed Athey Trailers are serving with U. S. combat engineers—they're building airports, military roads, air bases, encampments here and abroad—they're hauling supplies and equipment on construction operations in far-away outposts—they're doing tough toting jobs in muddy oil fields and mines.

Athey -"Caterpillar Dealers, too, are doing their big share. These dealers are providing fast, efficient repair facilities for vitally-needed equipment.

ATHEY TRUSS WHEEL CO., CHICAGO, ILL.

WOOD IS ONE OF THE MANY VITAL WAR MATERIALS ATHEY PRODUCTS ARE HELPING PRODUCE

Your CHEVROLET DEALER

SERVES . . .

for victory, day after day, in many, many ways.

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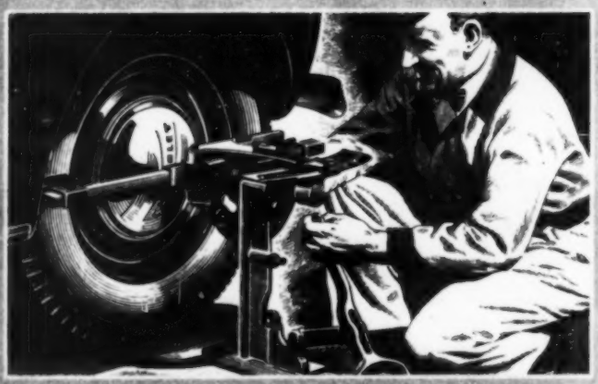
CONSERVES

the lives of the vital cars and trucks which are serving industry—serving agriculture —serving all America.



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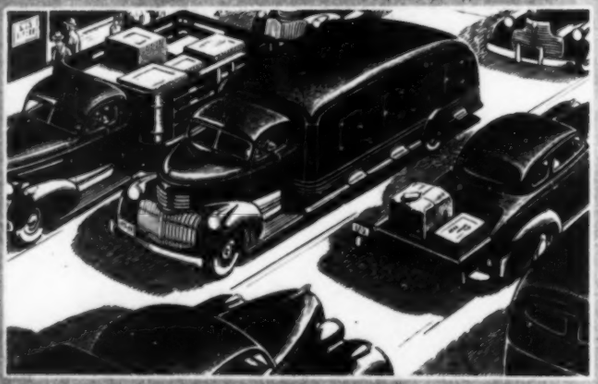
the great motorized transportation system which is helping America to win the war.



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ALBI—firepel "S"

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approved *by* Underwriters' Laboratories Inc.

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for protection against fire hazard

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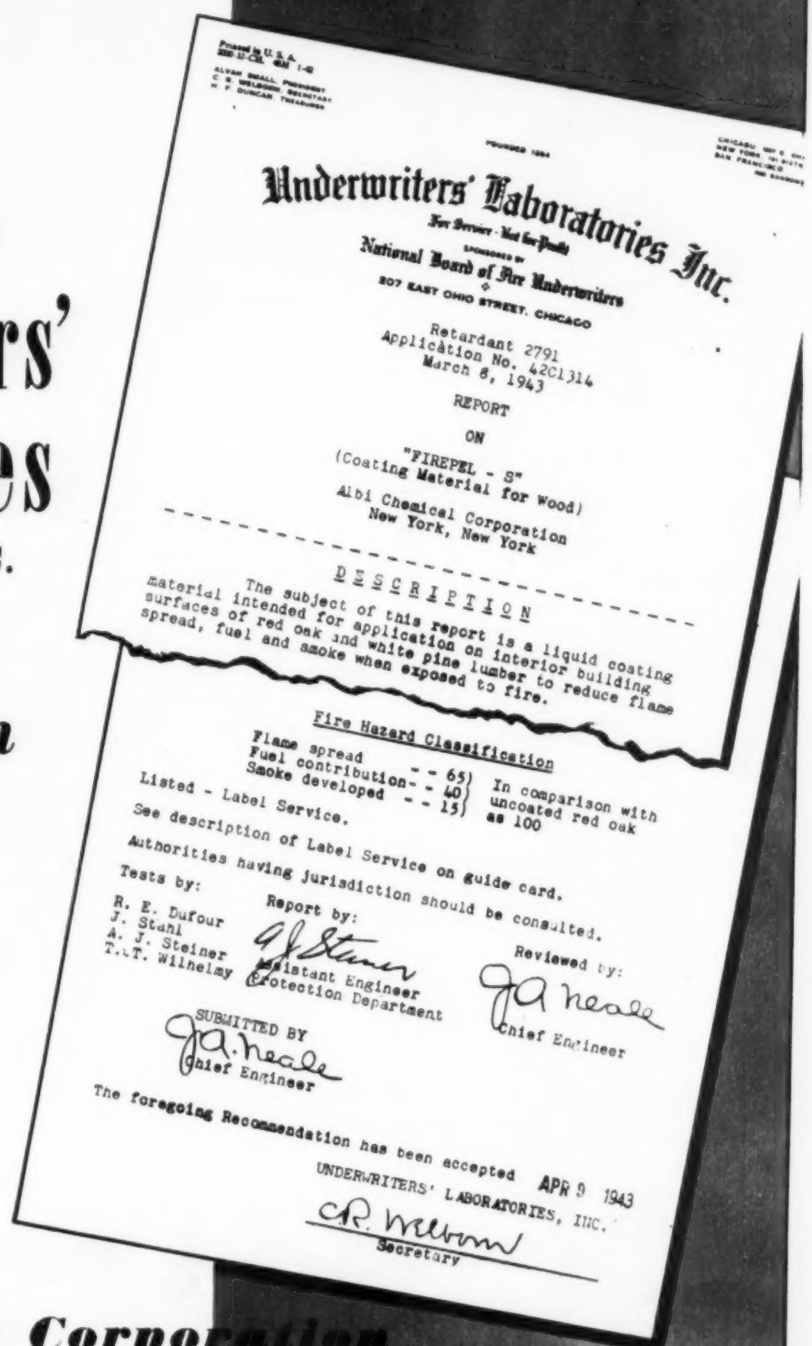

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Fire Protection - Property Conservation
Sponsored by
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207 EAST OHIO STREET, CHICAGO

Retardant 2791
Application No. 42C1314
March 8, 1943

REPORT
ON
"FIREPEL - S"
(Coating Material for Wood)
Albi Chemical Corporation
New York, New York

DESCRIPTION

The subject of this report is a liquid coating material intended for application on interior building surfaces of red oak and white pine lumber to reduce flame spread, fuel and smoke when exposed to fire.

Fire Hazard Classification

Flame spread - - 65
Fuel contribution- - 40
Smoke developed - - 15
} In comparison with uncoated red oak as 100

Listed - Label Service.
See description of Label Service on guide card.
Authorities having jurisdiction should be consulted.

Tests by:
R. E. Dufour
J. Stahl
A. J. Steiner
T. T. Wilhelmy

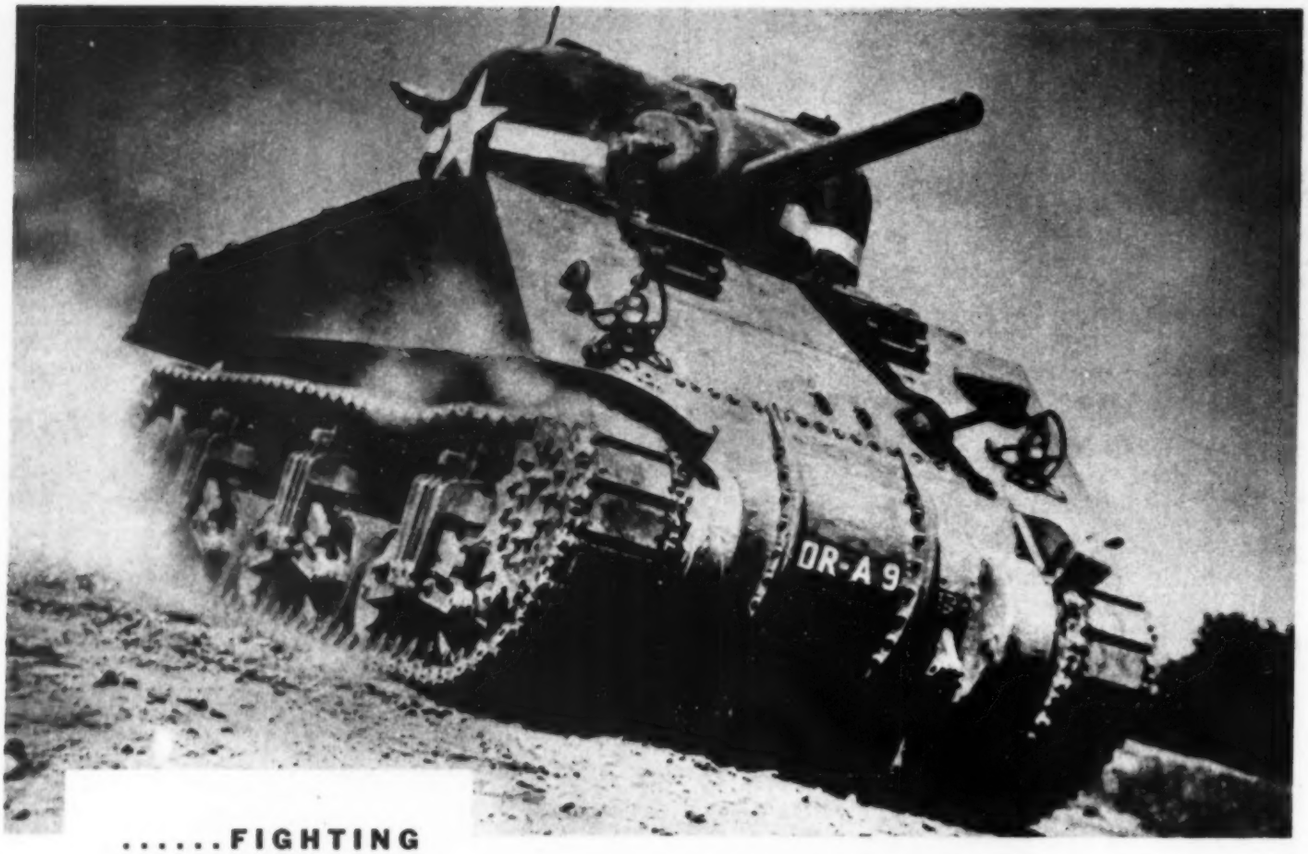
Report by:
A. J. Steiner
Assistant Engineer
Protection Department

Reviewed by:
J. A. Neale
Chief Engineer

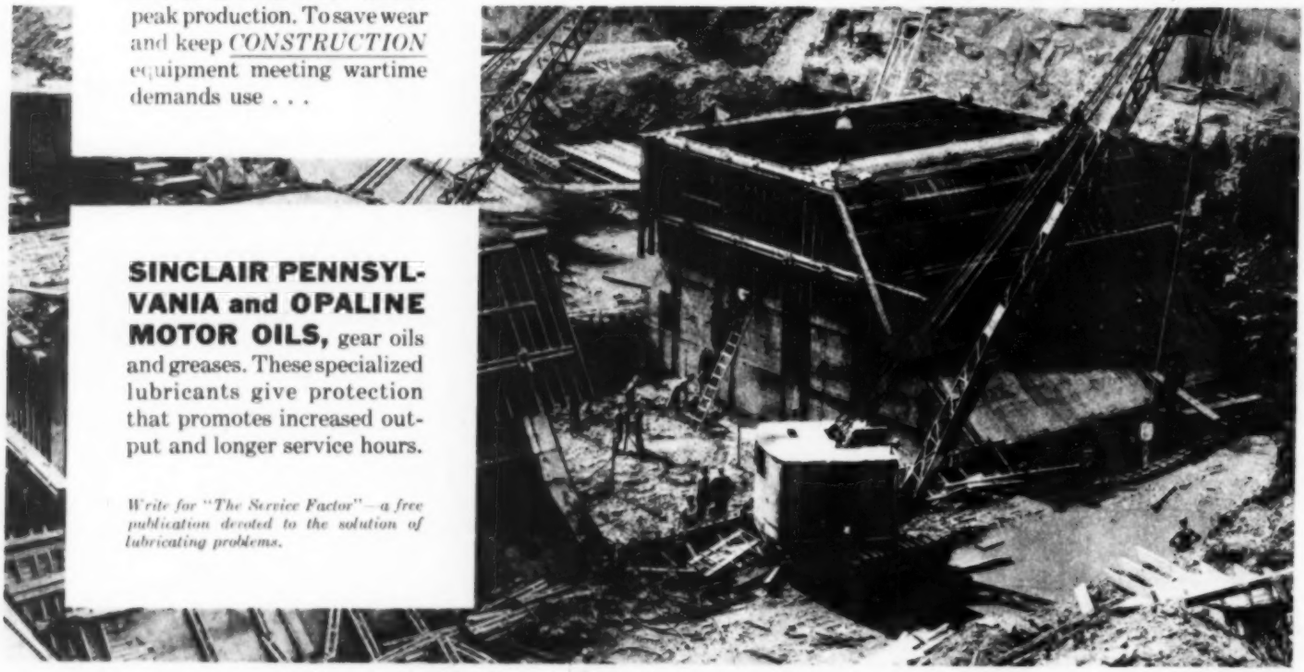
SUBMITTED BY
J. A. Neale
Chief Engineer

The foregoing Recommendation has been accepted APR 9 1943
UNDERWRITERS' LABORATORIES, INC.
C. R. Wilson
Secretary

ALBI ***Firepel Corporation***
9 Park Place • New York, N. Y.



.....FIGHTING STRENGTH needs peak production. To save wear and keep *CONSTRUCTION* equipment meeting wartime demands use . . .



SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS, gear oils and greases. These specialized lubricants give protection that promotes increased output and longer service hours.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

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To Earthmovers Planning to Use Fast-Moving Rigs...

TOURNAPULLS Can Lower Your Yardage Costs

More Than 900 Now Cutting Costs in 43 States & 13 Foreign Countries...They Can Do the Same for You

Save on Rigs and Manpower

When you use Tournapulls you begin your savings by requiring less equipment and fewer men. No big, expensive loading unit needed. One pusher tractor easily handles pusher loading of 3 to 4 Tournapulls, depending on length of haul. What's more Tournapulls spread their own loads on the move, require no investment in special spreading tools, add substantially to compaction, too. Finally, because Tournapulls are fast-moving and have big capacity, you get greater production with fewer units and consequently with fewer men.

Job Proved by 5 Years Use

Today's Tournapull design is based on more than 5 years of job proof on some of the world's largest and toughest earthmoving projects. 900 are now in use by over 100 successful earthmovers—most of them fleet users—in the U.S. and 13 foreign countries.

Backed by World's Best Dealer Service

Tournapulls are stoutly constructed to cut lost time to a minimum. The best of equipment, though, requires repair occasionally. Then you'll find quick, expert service available from 182 LeTourneau-"Caterpillar" dealers and branches in the U.S.

No other fast earthmoving rig today offers you: (1) so much yardage so quickly and cheaply, (2) job-proved assurance of profit, (3) quick service everywhere. Ask your LeTourneau-"Caterpillar" dealer about Tournapulls—a few are available for high priority projects—NOW.

(Above) You get big loads like this in 60 to 90 seconds, with a Super C, have plenty of surplus rimpull to accelerate up to 14.3 M.P.H. quickly and to pull through tough spots without delays.

OPERATION SIMPLE

Tournapulls are easy to operate. They shift like a truck, steer like a track-type tractor. Power Control Unit for controlling Carryall Scraper loading and spreading is same as that job-proved on thousands of tractor-scraper outfits. Powerful, sure-acting brakes on both Tournapull and Carryall assure quick stopping and complete control on grades.

(Below) Large pneumatic tires enable Green & Groesbeck Construction Co., long-time LeTourneau fleet user, to move 6 Tournapulls 544 miles over the highways to a new job, thus saving time and money, same time freeing flat cars for war freight. Actual driving time 40½ hours.

LETOURNEAU

PEORIA, ILLINOIS — STOCKTON, CALIFORNIA

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNA-TRAILERS*, TOURNAWELD*, TRACTOR CRANES.

*Name Reg. U.S. Pat. Off.

Made in sizes from 45 to 400 H.P. for Carryall Scrapers from 2.2 to 59 heaped yards capacity.

MORE POWER FOR TANKS TODAY— CHEAPER POWER FOR AMERICA TOMORROW!

AMERICA'S tanks pack a powerful push as well as a powerful punch. And more times than most people know, this push comes from a General Motors Diesel Engine.

What's more, you'll also find these rugged, hard-working power plants in landing barges, patrol vessels, military trucks, construction tractors and many other wartime jobs where sturdy dependability is required.

They burn cheaper fuel and use less of it—operate with a minimum of attention.

Of course the needs of war are taking every engine that even our expanded production can make, but when peace comes America will profit—through low-cost power for many new applications.

So while now GM Diesels are adding strength to America's fighting arm, they will be one of the important contributions to better days after victory is ours.

With each war there seems to develop a new era in transportation. And in this one there is the epoch-making General Motors Diesel Locomotive, tried, proved and providing a new pattern of transportation keyed to the greater days ahead.

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ENGINES . . . 12 to 250 H.P. . . . DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES . . . 200 to 2000 H.P. . . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

A "Grass Roots" Description of a High-Toned Word

THE word is Synergism—an old-timer in the dictionary, but new to the industrial vocabulary. In the business sense, synergism means minds "clicking" together so that the net result is an idea far greater than the sum of the thoughts expressed.

Synergistic thinking has worked the industrial wonders of war production. It has been accomplished by individuals, by groups, by companies. It has been responsible for new materials and improved methods to get better results.

In the construction field, Atlas has done some real synergistic thinking with its customers. One outcome has been the development of a series of bulletins that we call Atlas Contractors' Division Letters—temporarily modified by the necessities of censorship.

They are designed to offer, in down-to-earth fashion, ideas that will stimulate the solution of contractors' blasting problems. They give straight dope on local rock conditions, on transportation, water and power, based on intimate knowledge of the site.

With useful information and technical experience as a background, Atlas stands ready to think synergistically with any contractor. We think our minds will click with yours to solve your problems more effectively and more economically.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

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Brute of a job, eh?

DO IT EASILY

with Goodyear All-Weathers

YOU know what it takes to haul things "off the road" where there isn't any road—

Through mud and slime and snow, rain or fierce heat, or what have you!

You want to get the job done, on time, or ahead of time.

We're with you. Goodyear builds into the Goodyear All-Weather Earth Mover tire the things you need.

Its big, tough, husky tread grabs on and pulls. Its firm sidewalls, with the All-Weather tread reaching down to their center, resist cutting and gouging, even in shale and solid-rock blastings. You get side-traction and no side-slips.

Earth doesn't pack up in this broad tread—stones and dirt fall out—so this self-cleaning tire never slows you down.

High tensile cord carcass, extra-sturdy beads — man, this is your tire! Specify on new equipment Goodyear All-Weather Earth Mover; order from your Goodyear dealer for all present equipment.

For more than 20 years now it has been true that—***more tons are hauled on Goodyear truck tires than on any other kind.***

They made this road on Goodyears and now they're going ahead to make some more—for Victory!
GOODYEAR
THE GREATEST NAME IN RUBBER

All Weather—T. M. The Goodyear Tire & Rubber Company

Construction Methods

ROBERT K. TOMLIN, Editor

Volume 25 | JUNE, 1943 | Number 6

Engineer Corps Starts Big Drive to Enlist Monthly 9,000 Construction Specialists For Army Service Overseas

ACCEPTED AS SKILLED CONSTRUCTION SPECIALISTS under new recruiting program being conducted by Corps of Engineers, U.S. Army, JOSEPH SHENKEN, of New York City, and KENNETH POKORNI, of Yonkers, N. Y., inspect operation of tractor-bulldozer under direction of CAPT. T. J. ROBERTS.

THE CORPS OF ENGINEERS has recently announced a special recruiting drive for the enlistment of technicians for voluntary induction as skilled specialist to be assigned to Engineer troop units. Major General Eugene Reybold, Chief of Engineers, in challenging qualified civilians to volunteer for the Army's Corps of Engineers under this new plan to recruit 9,000 specialists a month said:

"The mission of the Army's Corps of Engineers is developing with the progress of our attack. We are finishing up the biggest emergency construction program the United States has ever seen. Now we're moving on to a program of construction overseas. We're in the middle of a big job now—the job of helping to move men and equipment into place for assault. We need men for this present job, as well as men for the next job coming up — the attack itself. This is a challenge to men who want to help engineer the forthcoming American victory — who want to get this war over with in a hurry."

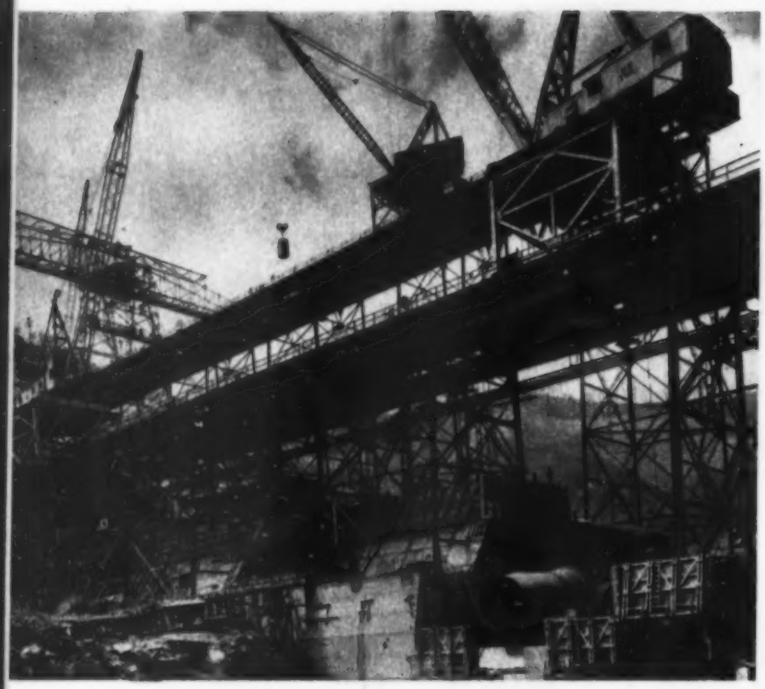
Under the plan announced by the Chief of Engineers, trained equipment operators who have been working as civilians on engineering and construction projects may, prior to their induction by Selective Service, volunteer for enlistment in the Corps of Engineers. The nearest Army Engineer office will take their application, pass on their qualifications, and provide them with a letter to their Induction station which will earmark them for duty with the Engineers. From the Induction station they will be sent direct to Engineer training centers at Fort Belvoir, Virginia; Fort Leonard Wood, Missouri; Jefferson Barracks, Missouri; or Camp Claiborne, Louisiana.

There are no age restrictions under this new enlistment program. All men over the ages of 18 who qualify in any one of 75 listed technical occupations will be accepted as an enlisted specialists in the Corps of Engineers.

The plan is designed to appeal to

(Continued on page 114)

THIS MONTH'S NEWS REEL



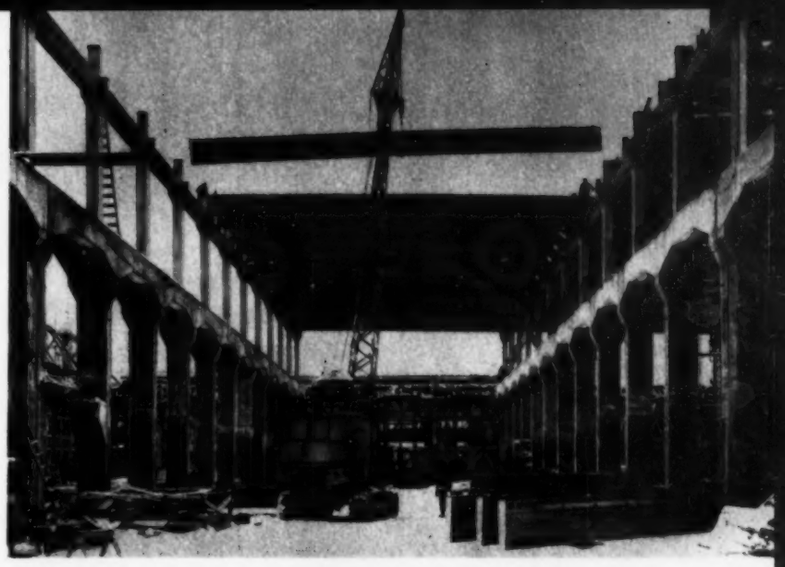
CONCRETE PLACEMENT AT FONTANA DAM in North Carolina is carried on night and day by forces of Tennessee Valley Authority to supply hydroelectric power. Structure 460 ft. high involving 2,800,000 cu.yd. of concrete is largest dam east of Rockies. Concrete is handled from two-level construction trestle by big hammerhead cranes and revolving gantry cranes. Sections of three power penstocks (in lower right corner) are almost ready to be embedded in concrete. Project manager is FRED C. SCHLEMMER, superseding C. E. Blee, recently appointed chief engineer of TVA.

AMERICAN ROAD BUILDERS' ASSOCIATION holds annual meeting and post-war conference in Chicago, May 4-7. New president of organization, CARL W. BROWN (in light suit), chief engineer, Missouri State Highway Department, confers with (left to right) JAMES J. SKELLY, of Media, Pa., president of association's Highway Contractors Division; LT. COL. ENOCH R. NEEDLES, chief, Construction Control Office, Corps of Engineers, U.S. Army; and CAPT. L. N. MOELLER, (CEC) director, progress control department, Bureau of Yards and Docks, Navy Department.

EIGHTY PERCENT COMPLETE is U. S. Bureau of Reclamation's Shasta Dam **(below)** across Sacramento River in California. When picture was taken, more than 5,000,000 cu.yd. of ultimate total of 6,000,000 cu.yd. of concrete had been placed in 602-ft. high structure 3,500 ft. long by Pacific Constructors, Inc., using seven cableways from 460-ft. high head-tower. First concrete was placed July 8, 1940. Concrete is poured in blocks 50 ft. square raised in alternate 5-ft lifts. High blocks in abutment at right are within 20 ft. of ultimate height. In foreground are five 15-ft.-diameter steel penstocks.

BRITISH AMBASSADOR to the United States, LORD HALIFAX, shakes hands with MRS. JENNIE BARTOLO, wife of a welder at the shipyards of the Dravo Corp., Pittsburgh, Pa., following successful launchings of LST (landing ships for tanks) ship and sub-chaser for Navy Department.

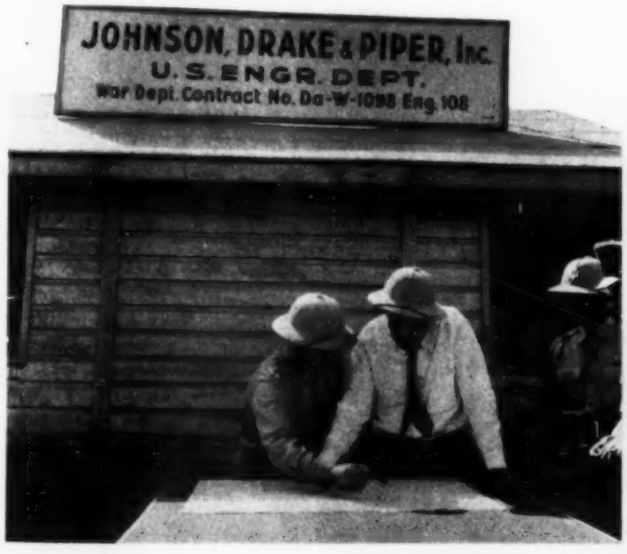
POST-WAR HIGHWAY PROGRAM involving annual expenditure of 3 billion dollars for at least five years, supplemented by yearly outlays of 2 billion dollars for other types of public works construction, and 10 billion dollars for private construction, is advocated in report recently prepared for the American Road Builders' Association by CHARLES M. UPHAM **(left)**, engineer-director and DANIEL R. LAMSON, research engineer. The study, sounding keynote for ARBA's annual meeting and post-war conference in Chicago, May 4-7, assumes a national income of at least 100 billion dollars and a total annual construction volume of 15 billion dollars. If no planned post-war program is ready when peace comes, report points out, duplication of CWA and WPA programs of depression years will be inevitable.



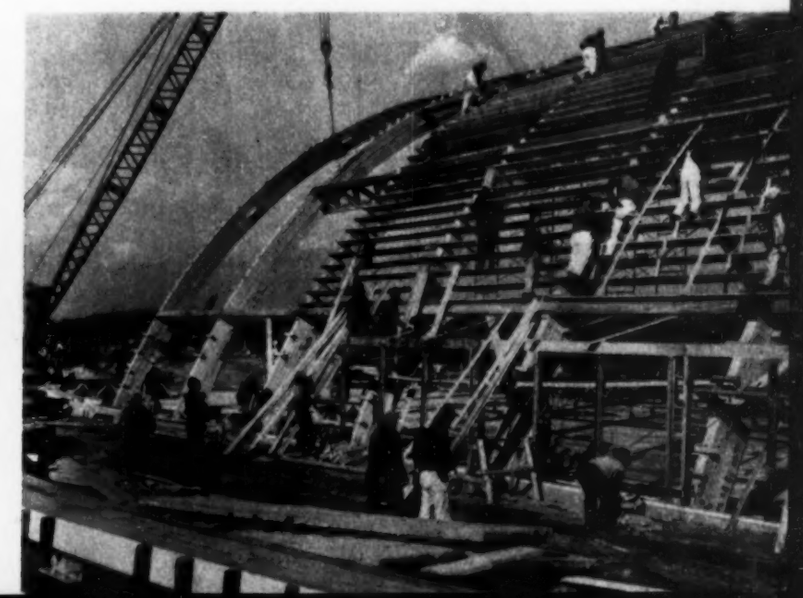
HEAVY ORDNANCE MATERIAL BUILDING in Middle West, one-story structure 300x800 ft. in plan, is designed by U. S. Army Engineers to conserve steel by using combination of concrete framework and laminated timber beams for roof. Along five 60-ft. bays 2x3-ft. reinforced concrete columns, spaced on 20-ft. centers, support girders carrying rails for overhead cranes. Here shown is Koehring crawler crane equipped with 70-ft. boom and 10-ft. jib, setting one of 7½x38-in. laminated and glued timber roof beams spanning 60-ft. bay. Under direction of Col. W. J. Matteson, U. S. District Engineer at Rock Island, Ill., $2,500,000 structure was built by T. S. Willis Construction Co., of Janesville, Wis., contractor for substructure, and Priester Construction Co., of Davenport, Ia., contractor for superstructure.

FIRST ENGINEERING-CONSTRUCTION SPECIALISTS enlist as volunteers in Corps of Engineers, U. S. Army, under new recruiting program to obtain 9,000 trained equipment operators and technicians who have had experience as civilians on Army's emergency construction program which is now tapering off. At headquarters of North Atlantic Division in New York City **(left)**, LT. COL. RALPH EBERLIN accepts for service CALVIN PRINCE, World War veteran, and HERMAN W. BERGMAN. All men over age of 18 may qualify as enlisted specialists prior to induction by Selective Service. Accepted applicants will be earmarked by local draft boards for duty with Corps of Engineers and will be sent to Engineer training centers in Virginia, Missouri or Louisiana. Volunteers should apply at nearest Area or Division office, Corps of Engineers, U. S. Army.

AMERICAN CONTRACTOR'S FIELD OFFICE IN MIDDLE EAST (below) is visited by WENDELL L. WILLKIE, 1940 Republican presidential candidate, during his recent round-the-world tour. Under sign of Johnson, Drake & Piper, Inc., somewhere in Egypt, Mr. Willkie examines plans of U. S. Engineer Department project being directed for the contracting firm by Robert P. Bayard. Photo, Life Magazine



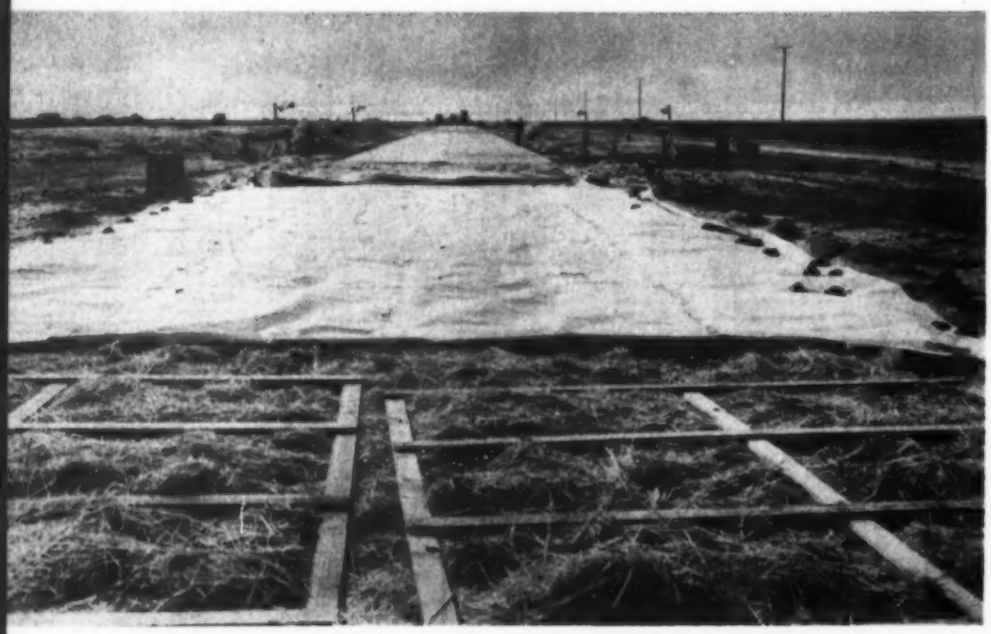
LAMINATED TIMBER ARCHES (below) provide framework for 120x625-ft. Navy drill halls at Camp Bainbridge, Md. Asbestos-cement sheets are used for exterior sheathing on all camp buildings to save critical plywood. Arch ribs of 63½-ft. radius, fabricated in two sections, consist of 37 pieces of 1x8-in. lumber glued under pressure to give net section 30 in. deep and 7½ in. wide. Ribs are spaced 16 ft. c. to c. Chas. H. Tompkins Co., of Washington, D. C. held general contract concerning 330 buildings of various sizes and types. Lt. Comdr. Joseph White and Capt. Ira P. Griffin are Navy officers in charge.



Military Airport Paved With Concrete in

Near-Zero Weather

Using Special Technique to Beat Rush Schedule



BLANKET OF STRAW 1 ft. thick is spread over finished concrete surface as soon as possible without injuring surface. Straw is then covered with 25x25-ft. sheets of heavy waterproof paper weighted with stones at edges.

SPECIAL COLD-WEATHER CONSTRUCTION TECHNIQUE made it possible to mix and place concrete for paving runways at a military airport in the Pacific Northwest in near-zero temperatures and allowed work begun last November on a rush schedule to meet wartime needs, to proceed continuously without the usual winter shutdown. The project, built under the direction of the Corps of Engineers for the Air Corps, involved a total of almost 1,500,000 sq.yd. of paved concrete surface in two runways, each 500 ft. wide and 10,000 ft. long, in addition to the paving of taxiways and aprons. To meet the requirement that the temperature of the concrete should never be allowed to fall below 60 deg. F. during any stage of placing and finishing operations, the contractors, Woodworth & Co., Inc. and MacDonald Building Co., followed a procedure of covering the prepared subgrade to keep it from freezing prior to pouring concrete, heating and protecting from cold all ingredients of the concrete mix and adapting mechanical equipment for cold-weather operation by insulation, housing and other protective measures.

Aggregate-producing plants were inclosed to prevent freezing and storage bins were completely housed

CARRYALL SCRAPERS (below) pick up protective sand coating, scraped up by bladers, and deposit it outside area to be paved.

and heated to keep aggregates warm during non-working hours and also to provide comfortable quarters for the operating personnel. Steam at 100-125 lb. per sq.in. pressure for heating the aggregate bins was provided by a 165-hp. coal-fired boiler.

Water Heating Methods

Hot water for the concrete mix and for other purposes was supplied by a housed heating plant comprising two boilers, one a 250-hp. coal-fired unit furnishing steam at 100-125 lb. per sq.in. and the other a 90-hp. standby, maintained under pressure. Water was delivered from a nearby lake through a 10-in. wood stave pipe line discharging into an 18,000-gal. supply tank. The water, heated by steam coils in two tanks of 1,800 and 2,500-gal. capacity, was fed by gravity into insulated tank trucks of 1,200-1,800-gal. capacity which served the paving mixers. During midwinter mixing water was heated to 160 deg. F.; this temperature was

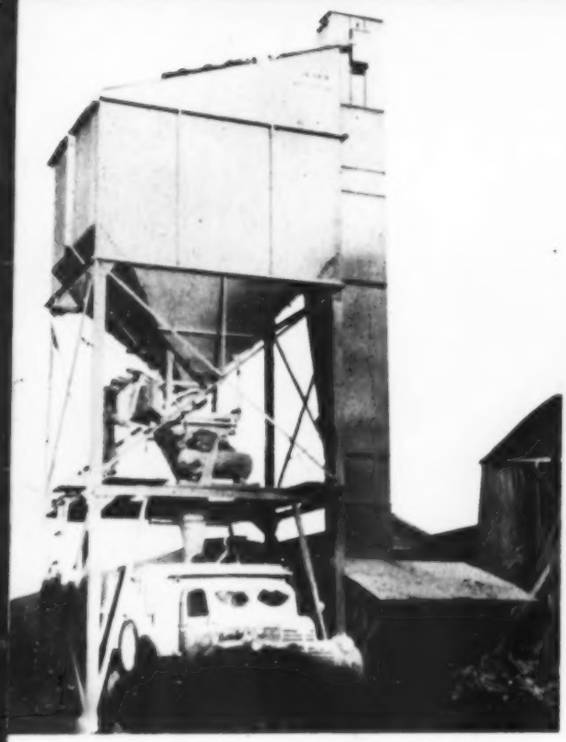
TRACTOR-MOUNTED SUBGRADE TEMPLATE does finegrading just ahead of pavers seen engaged in surfacing operations in backyard.

WATER-HEATING PLANT supplying insulated tank-trucks that serve paving mixers, consists of two coal-fired steam boilers with heating coils in water tanks.

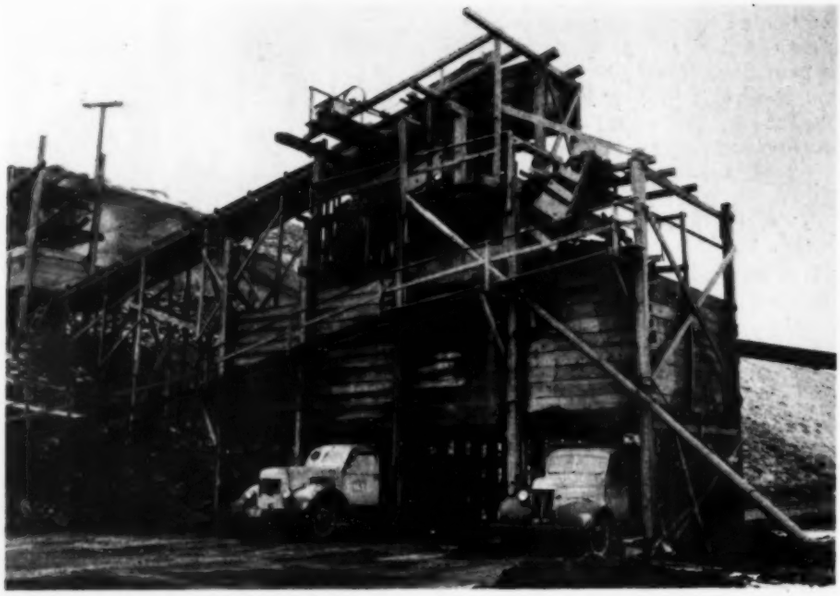
TANK TRUCKS receive water from heating plant at 175 deg. F. Truck bodies are insulated by two walls of plywood lined with Sisalkraft paper with dead-air space between.

PROTECTIVE SAND COATING 6 in. thick **(below)** is bladed off subgrade after it has served its purpose of absorbing frost until paving is begun.

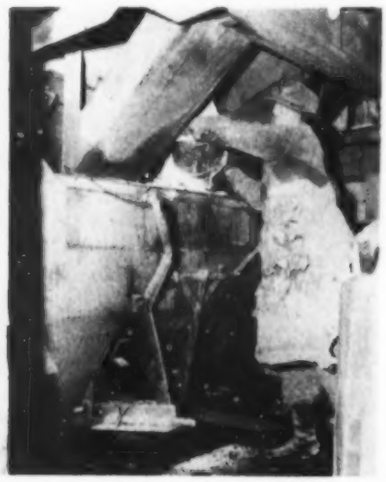
HOT WATER ARRIVES at mixers in 1,200 to 1,800-gal. tank-trucks **(below)** at temperature loss of only 10 to 15 deg. during trip from heating plant.



BULK CEMENT SILO is erected alongside railroad siding several miles from airfield. Cement content in concrete was raised from 1¼ to 1½ bbl. per cu. yd. during cold weather.



AT ROCK-CRUSHING PLANT aggregate is belted into bunkers for gravity delivery to trucks



CALCIUM CHLORIDE was added to mix at rate of about 2 lb. per sack of cement, ratio changing according to temperature.

TWO OR THREE MIXERS (below) worked side by side to speed progress in laying 25-ft. widths of runway strip. Hot water delivery piping is interconnected to receive water at just one point from insulated tank-truck.

reduced to 140 deg. F. in late winter when daytime temperatures ranged from 25 to 40 deg. F.

Insulation for the tank-trucks was provided by a double layer of waterproof plywood with an intervening dead-air space. With this protective covering the tanks delivered water to the pavers with a loss in temperature of only 10-15 deg. F.

Paving Procedure

The two 10,000-ft. long airport runways, each 500 ft. wide, were paved in 25-ft. wide lanes by mixers working in pairs, side by side, so that it was possible to interconnect the hot water delivery piping of each unit. This arrangement allowed the tank-trucks supplying hot water to serve the two mixers from one point by pumping into a system feeding both pavers.

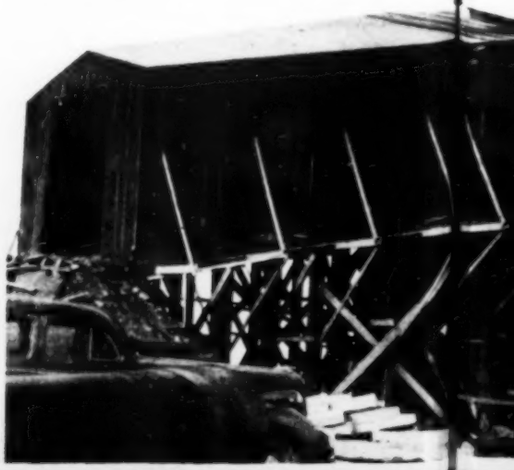
When paving operations were started last fall the standard cement content of 1¼ bbl. per cu. yd. was used, but when the weather became cold this was increased to 1½ bbl. and calcium chloride was added to the mix at the rate of 1-2 lb. per sack of cement, the ratio of calcium chloride within this range depending upon the temperature prevailing at the time.

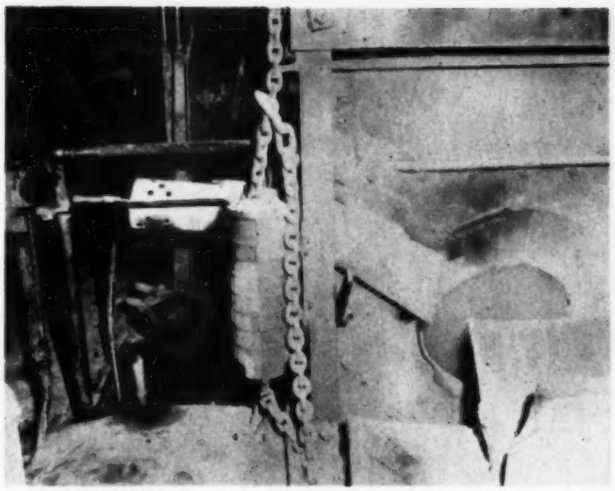
Adjoining the batching plant, equipment was erected for drying and heating the coarse sand to a temperature of 150 deg. F. The dryer is an oil-fired rotary kiln into which the sand is fed from a bucket elevator. Inside the cylinder, angle bars pick up the sand and let it fall through a stream of hot gases kept in motion by a 30-hp. blower.

Sand Cover for Subgrade

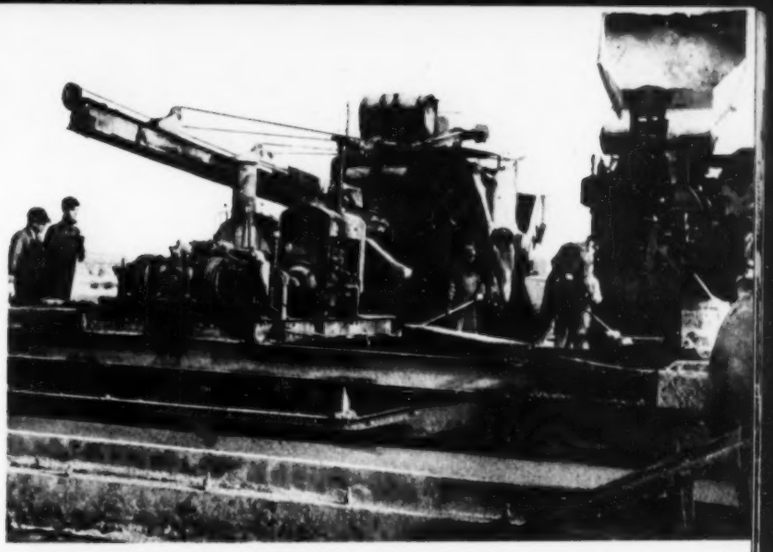
Two alternate methods of subgrade protection were given consideration: (1) To leave finished subgrade exposed and then thaw out the frozen areas just prior to paving, or (2) to protect the subgrade by blanketing it with a 12-in. layer of straw or a 6-in.

FOR COLD WEATHER PROTECTION (below) aggregate and cement batching plant were completely inclosed.





FLAME THROWER is rigged up to direct flame into open end of mixer drum thereby raising temperature of contents.



TWO 27-E PAVING MIXERS work together with finishing machine. In foreground, template makes grooves for "dummy" joints. After indentation is made in fresh concrete, 1/4x2-in. dummy joint is inserted.

layer of bank-run sand and remove this immediately before paving. The latter method was decided upon, and as the pavers approached this blanket cover it was bladed up with a grader and removed with carryalls or bulldozed to one side into windrows for use again. A means of keeping down the operating costs in this part of the work was to delay the fine grading operations until the approach of the pavers, thus reducing to a minimum the time of exposure.

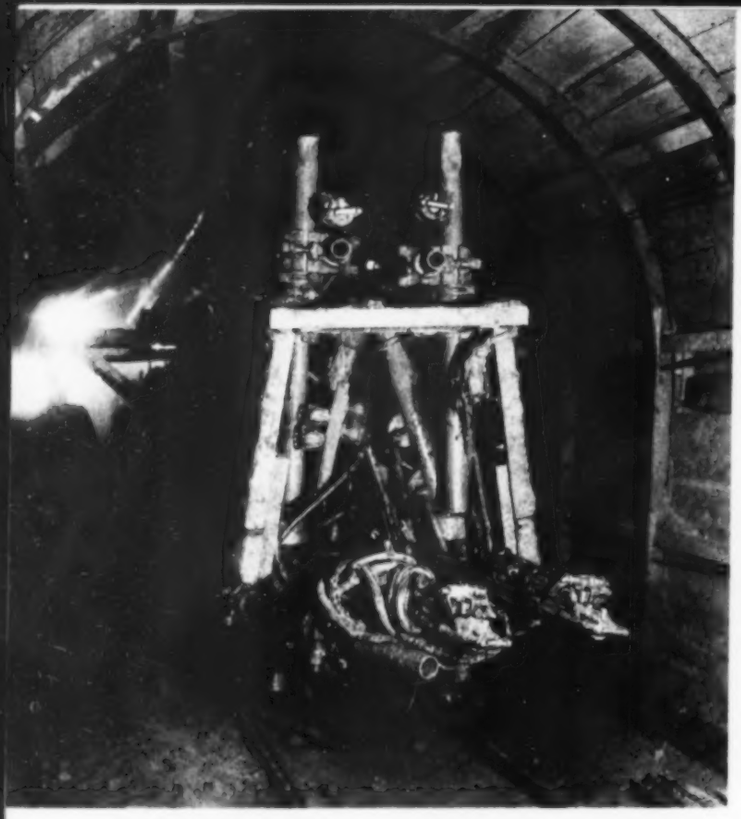
Although steel forms were provided for this work, the lower heat conducting qualities of wood made it preferable to use the latter during the coldest weather. The use of steel forms was resumed with the return

(Continued on page 138)

LONGITUDINAL FINISHING MACHINE (right), propelled by gasoline motor, follows transverse finisher. Salamander helps keep operator warm on cold days.

HAY AND STRAW (below) 3,000 tons of which was purchased for this job to protect freshly poured concrete from cold, is stockpiled near runway for later use.

COLORLESS CURING MEMBRANE of Hunt process **(below)** is applied by spraying on fresh concrete surface. In background is one of many piles of baled hay for protective covering of newly laid concrete.



TRACK-MOUNTED JUMBO, shown here with wings down, is used in drilling Tunnels 1 and 3. It is equipped with posts and bars for carrying four automatic drifters.

TRACK IS LAID AHEAD after mucking out Tunnel No. 3. Track of 56-lb. rails is kept in good shape permitting rapid runs out of long tunnels bored from one end.

Three Tunnels

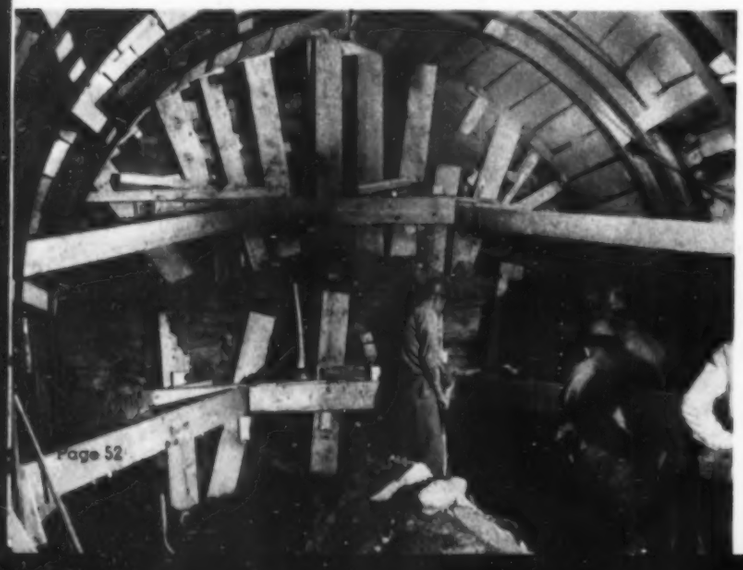
Driven by Full-Face Drilling With Detachable Bits

THREE TUNNELS TOTALING 20,131 FT. in length are part of the 70-mi. Conchas irrigation canal, principal feature of the U. S. Bureau of Reclamation's Tucumcari project in Quay County, N. M. The three tunnels under this contract, Nos. 1, 2, and 3, are 2,500, 7,931 and 9,700 ft. long, respectively, horseshoe-shaped, 11 ft. 6 in. in diameter, and concrete-lined. Contract for the construction, including both boring and concreting, was held by Jahn-Bressi-Bevanda Constructors, Inc., of Los Angeles, who started work March 17, 1940. The following notes on the methods and the equipment used in driving the three tunnels, all of which required timbering, are from a recent report by H. E. Robinson, associate engineer, U. S. Bureau of Reclamation, in charge of the Conchas Division.

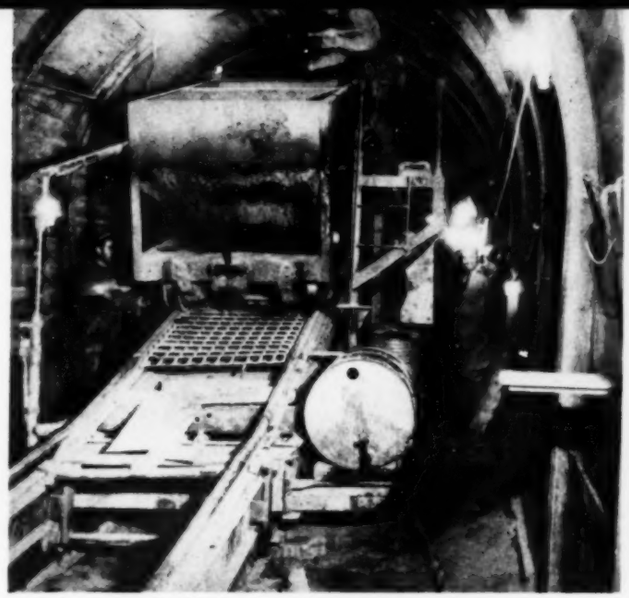
Since the distance from tunnel No. 1 to tunnel No. 3 is approximately 20 mi., the contractor established at the outlet of tunnel No. 2 a central camp from which all work

(Continued on page 120)

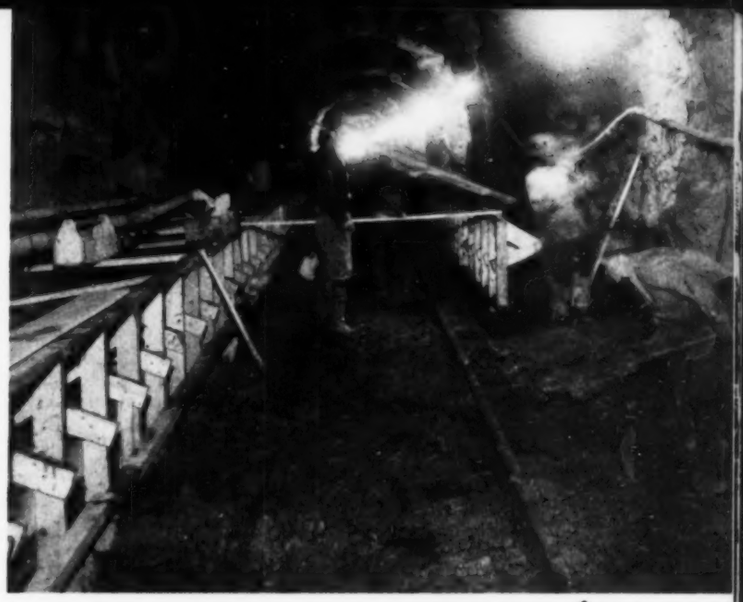
SOFT GROUND (below) encountered in Tunnel 2 makes it necessary to drive spiling ahead and breast-board face.



CHERRY PICKER (below) moves cars in Tunnel No. 2 although passing track proved more satisfactory for switching cars at heading



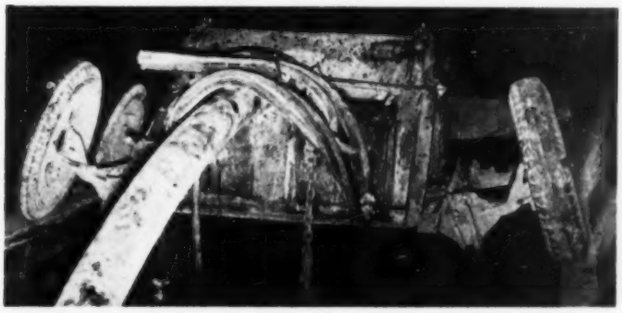
CONCRETE DRY BATCH is dumped on conveying belt for delivery to Koehring 27E mixer.



WOODEN CURB FORMS are set in untimbered section of Tunnel No. 1 where bore goes through hard sandstone.

ARCH AND INVERT SHOOTING LINES for concrete lining extend from Prestweld machine which is used on all three tunnels.

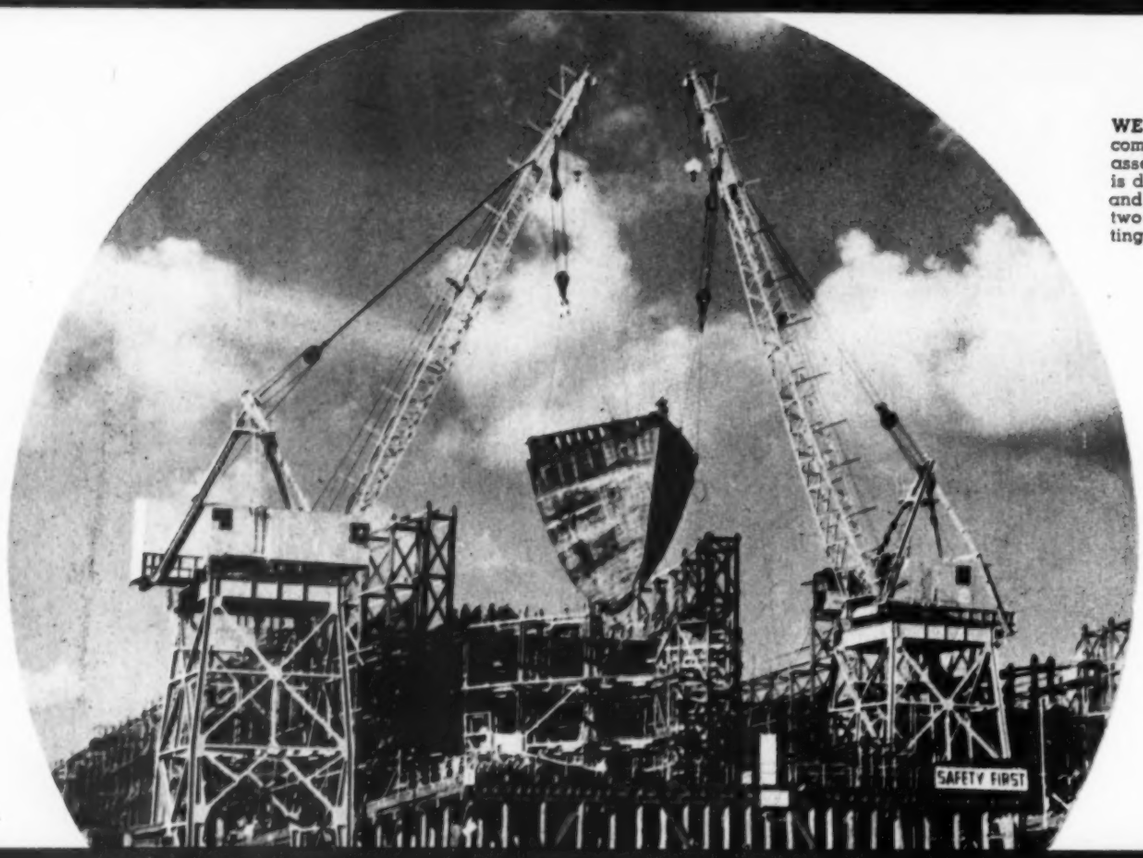
DRY BATCH CONCRETE TRAIN enters Tunnel No. 3. Exide 25-plate, 56 mva Bycap storage batteries are used on 8-ton Atlas locomotives.



INVERT CONCRETE passes through pipe line from Prestweld machine into receiving hopper, mounted on rubber-tired wheels riding on concrete sidewall curbs.

STEEL ARCH (below) and wooden forms used for outlet closed transition on Tunnel No. 1.

CONCRETE LINING EQUIPMENT (below) consists of conveyor, Koehring mixer, Prestweld air gun, air tank and shooting line.



WEIGHING 54 TONS, completed forepeak, pre-assembled by welding, is delivered to shipways and swung into place by two gantry cranes for fitting into steel hull.

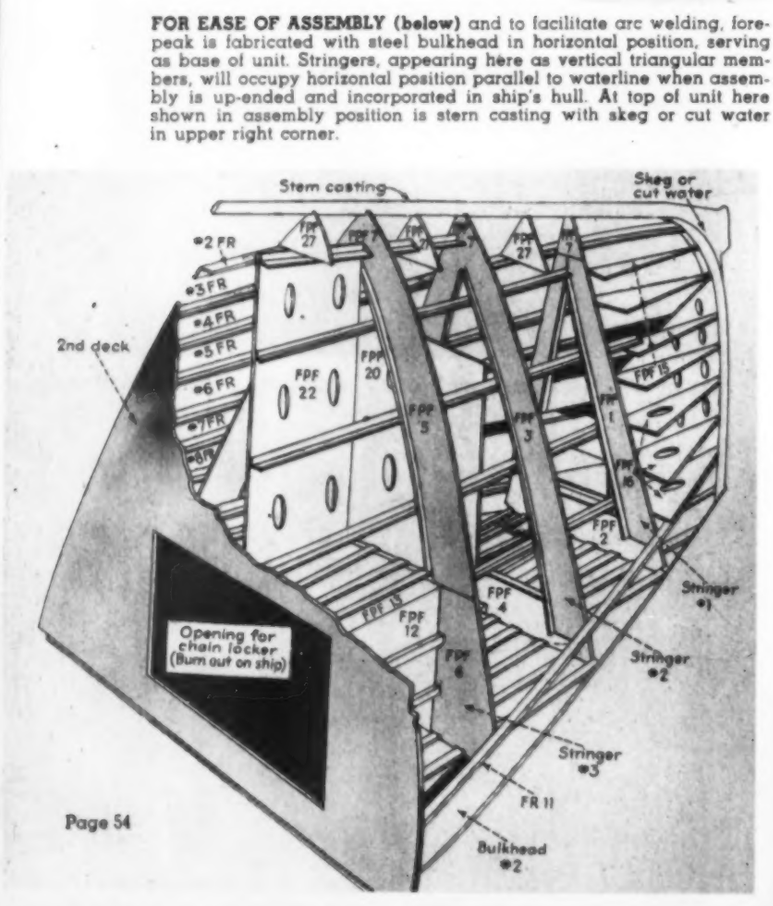
STEEL SHIP FOREPEAK WELDED INTO 54-Ton Pre

FOR EASE OF ASSEMBLY (below) and to facilitate arc welding, forepeak is fabricated with steel bulkhead in horizontal position, serving as base of unit. Stringers, appearing here as vertical triangular members, will occupy horizontal position parallel to waterline when assembly is up-ended and incorporated in ship's hull. At top of unit here shown in assembly position is stern casting with skeg or cut water in upper right corner.

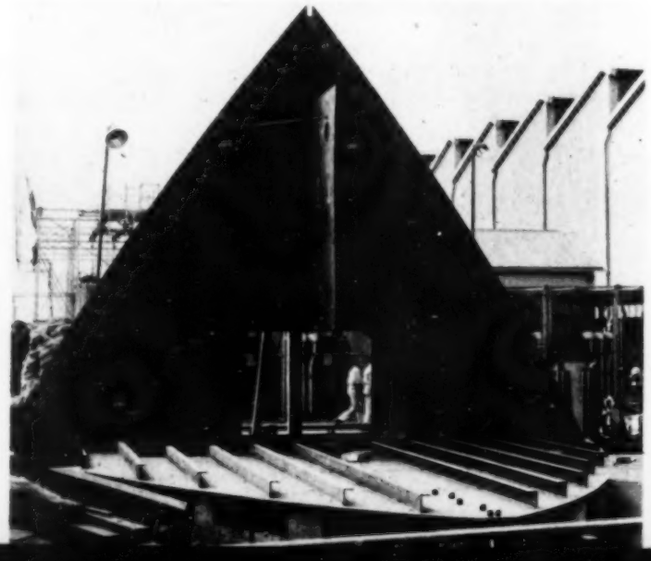
By AL T. RADKA

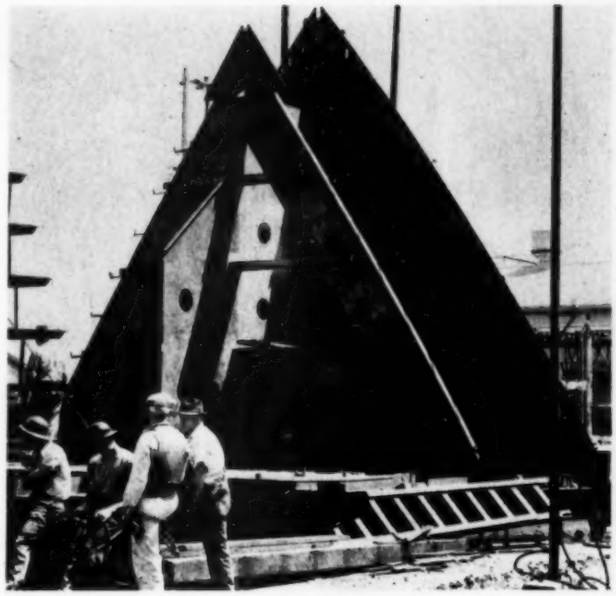
California Shipbuilding Corp., Wilmington, Calif.

From a paper submitted to the James F. Lincoln Arc-Welding Foundation in its recent $200,000 Industrial Progress Award Program dealing with advances and improvements in applications of arc welding.

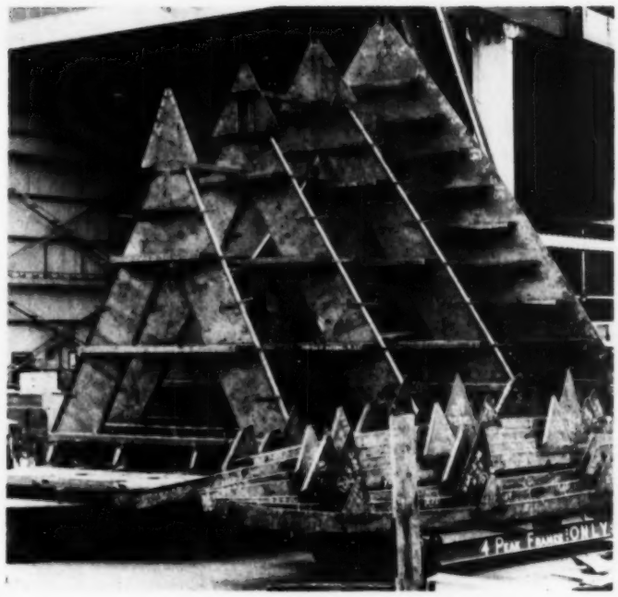


1 STEEL BULKHEAD (below) is placed in horizontal position on cribbing and triangular shaped section of second deck with swash plate attached is set vertical, plumbed and tack-welded in place.





2 **STEEL STRINGER No. 3** is erected behind second deck unit and is tack-welded to bulkhead at base.



3 **THREE STRINGERS** and second-deck section are in position. In foreground is group of forepeak frames.

...re-Assembly

IN AMERICA'S WAR PRODUCTION EFFORT, speed is most essential. We must build our ships, tanks, planes and guns faster than the enemy. The men of the California Shipbuilding Corp. realized this when they began their huge task of building cargo vessels in September of 1941. At the start, the forepeaks and afterpeaks were assembled on the ways, piece by piece. A great amount of riveting was done on these sections, and the process of assembling them plate by plate was long and tedious.

It was then decided that the forepeaks and afterpeaks should be built as *separate* units on pre-assembly skids. This was something new in shipbuilding technique, but the men of Calship soon proved they could do it. By this new process, they not only speeded up the production of the sections, but they also eliminated the riveting used in the old-fashioned method. They learned how to weld them — and that was the big time-saver. The following discussion and the accompanying illustrations tell how the forepeaks are assembled.

When we first started building forepeaks there was some riveting on the section, but all it led to was a lot of trouble. As one riveting foreman put it: "You can imagine what a tough job it was passing those hot rivets around those tight quarters inside a forepeak. And by the time you got

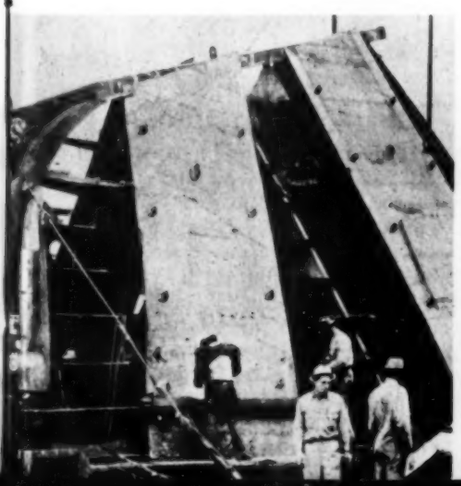
(Continued on page 116)

4 **STEM CASTING** has been set atop ends of stringers to form prow of ship as welders work on assembly at different levels.

5 **SHELL PLATING (below)** is applied to completed steel framework of assembly.

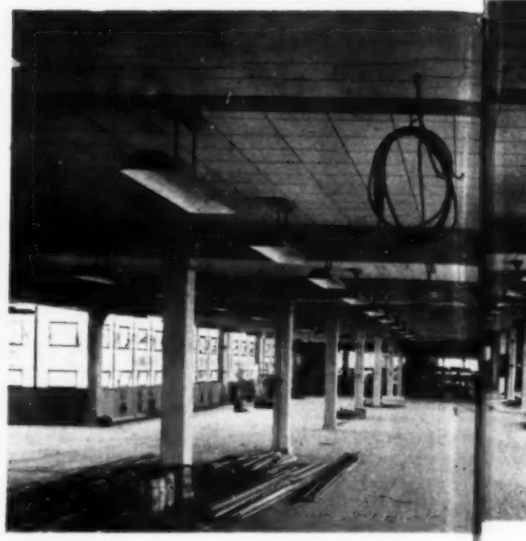
6 **FROM STAGING (below)** at various levels shell plating has been applied so as to inclose framework almost completely. Stem of forepeak is inclined member extending across top of assembly.

7 **FOREPEAK TAKES SHAPE (below)** as welding of shell plating nears completion. Triangular surface in foreground, shown in vertical position, is portion of deck containing rectangular opening above chain locker.

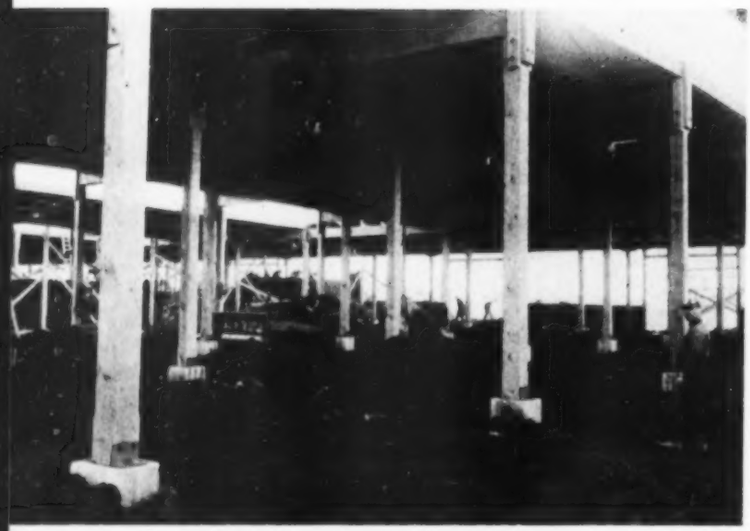


Naval Supply Depot

Makes Outstanding Progress on 60-Hour Work Week



ADMINISTRATION BUILDING (above, right) is timber-frame structure with acoustical tile ceilings, fluorescent lighting and asbestos-cement wallboard lining, as indicated by this interior view of second floor. Asphalt floor tile is still to be laid.



INSIDE GENERAL STOREHOUSE, tractor-bulldozer grades earth fill preparatory to concrete floor construction. This storehouse has floor at ground level.

U. S. Navy Official Photo

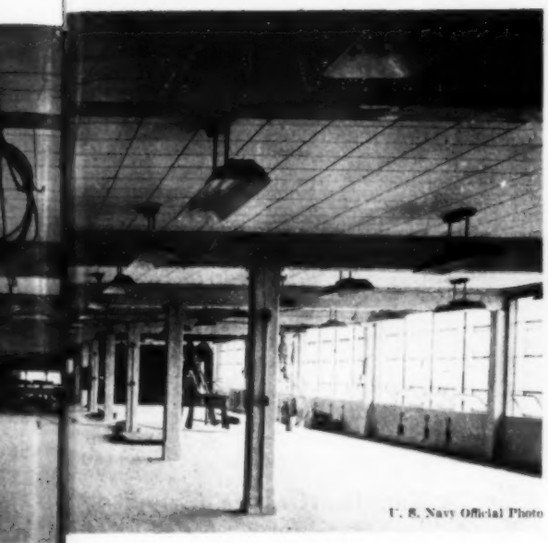
STORM DRAINAGE from 168 acres of roofs and 200 acres of streets will pass through twin 78-in. concrete pipes discharging into nearby creek. Crane handles pipe sections into trench. U. S. Navy Official Photo

DOUBLE AND TRIPLE SHIFTS of construction workers are not the only answer to rapid progress on war projects, according to the experience of the constructors on a $45,000,000 supply depot for the Navy in the eastern United States. Grading an 800-acre site, installing multiple utilities and erecting structures designed to make minimum use of critical materials, the contractors on this job, with a single shift working a 7-day, 60-hr. week, set a pace which enabled the project twice to win the Public Works pennant awarded by the Bureau of Yards & Docks of the Navy Department for the best progress reported in the preceding interval of three months among 52 competing projects each costing $600,000 or more. Good organization and effective utilization of the working forces during the daylight hours made it possible to push the huge project rapidly to completion.

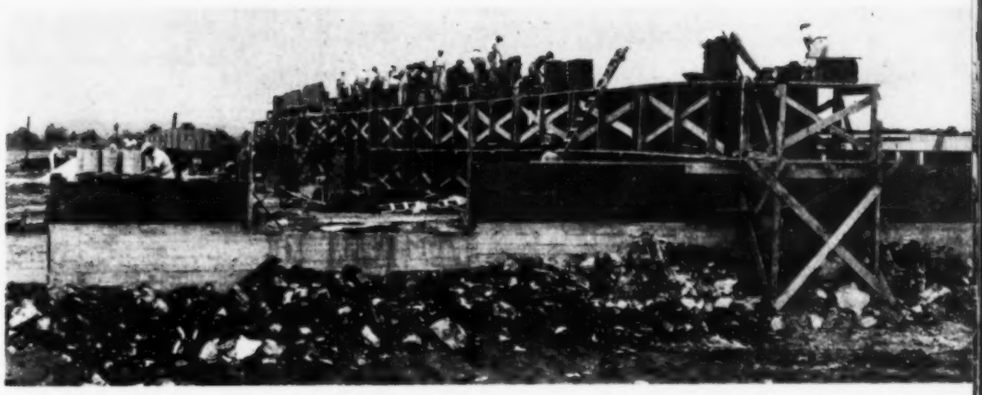
Non-Critical Materials Used

Construction involved a variety of buildings and utilities requiring large quantities of non-critical materials substituted by the designers for conventional products caught in war-induced shortages. For example, the supply depot uses timber for the structural frames in 65 buildings, of which 55 are large one-story warehouses covering 160 acres of ground. About 25,000,000 b.ft. of timber went into the framing of the buildings, and an additional 30,000,000 b.ft., employed for other purposes in the structures, increased the total wood consumption to 55,000,000 b.ft.

Other items on the construction bill were equally heavy. Some of the figures are as follows: 3,000,000 cu.yd. of excavation, mostly rock; 225,000 cu.yd. of concrete; 11,500,000 brick; 7,000,000 sq.ft. of finished concrete floor; 168 acres (73,000 squares) of built-up roofing; nearly 1,000,000 sq.ft. of steel sash; more than 2,500,000 sq.ft. of asbestos-cement siding; more than 1,200 wood overhead doors; nearly 470 fire doors; 8 mi. of downspouts; 42 mi. of railroad track; streets and roads equivalent to 90 mi. of 20-ft. width; 15 mi. of concrete curbs; some 30 mi. of storm sewers; more than 7 mi. of sanitary sewers; and 20 mi. of water mains. No data are at hand on interior mechanical installations of the 65 buildings, but quantities of electrical conduit and fixtures, plumbing, heaters, heating ducts and sprinkler systems are

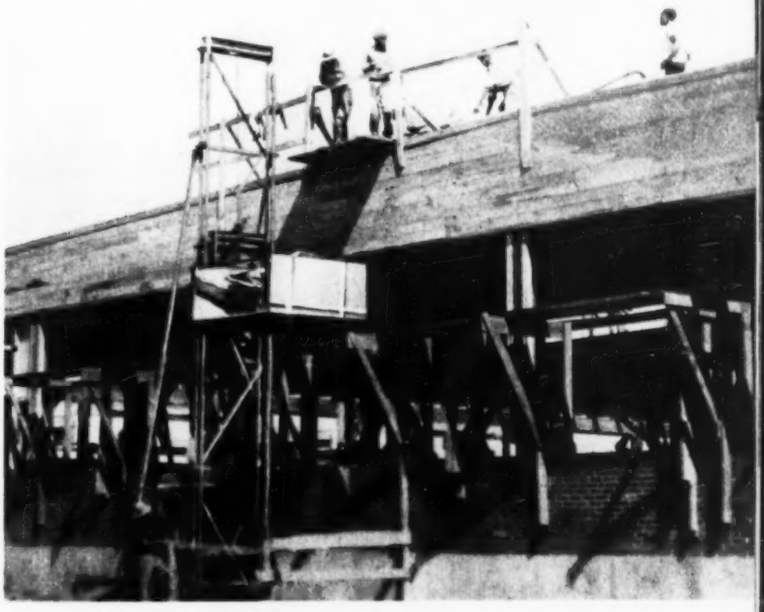


U. S. Navy Official Photo



BRICK FIREWALLS separate each general storehouse into four units. Brick is widely used on project both to save reinforcing steel and to make use of available resources of brickyards and bricklayers.

FOR NAVY DEPARTMENT, five Civil Engineer Corps officers direct operations on project. Seated at desk is Lt. Comdr. H. V. MARTIN, officer in charge of construction, backed up by (left to right) Ensign JULIAN KHEEL, Ensign NANDO ARDUINI, Lieut. (j.g.) JAMES P. MARSHALL and Lieut. C. T. FORD, executive officer.



PORTABLE HOIST TOWERS with cantilever platforms handle brick to upper levels.

TWO PUBLIC WORKS PENNANTS of Navy Department, won on separate months for best progress records during preceding three months in competition with 51 other Class 1 projects, fly proudly below Stars and Stripes from mast on administration building.

U. S. Navy Official Photo

SUBSTITUTES USED FOR WAR-CRITICAL MATERIALS

Timber instead of steel for structural frames.

Plastic flashing instead of copper.

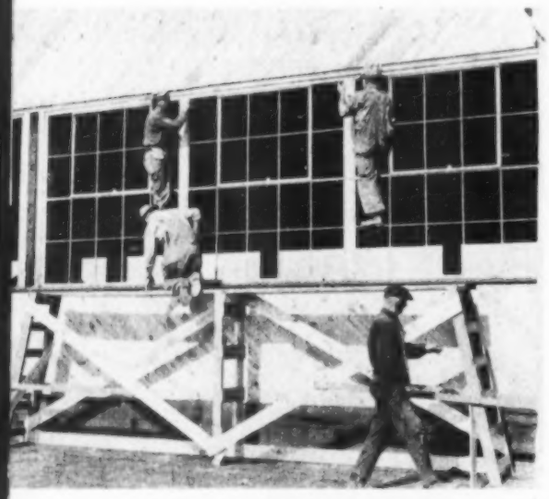
Gypsum roof drains instead of metal gutters.

Zinc-coated iron downspouts instead of copper pipe.

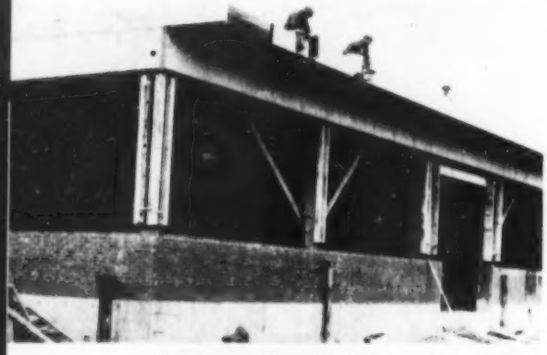
Asbestos instead of metal for heating ducts.

CANTED CRICKETS of poured gypsum at roof edge train flow of stormwater into leaders, dispensing with conventional gutters of critical materials.

HEAVY MATERIALS WAREHOUSE with central craneway bay spanned by 66-ft. timber trusses has its roof deck covered by built-up roofing, as indicated by asphalt kettles and rolled felt visible on lower level. This building is one of minority having concrete spandrels above foundation walls.



ONLY CRITICAL MATERIAL used where acceptable substitute would do is steel in window sash. These sash were made prior to steel shortage.



ASBESTOS-CEMENT SIDING 3/16-in. thick is attached to wood sheathing with No. 10 electro-galvanized wood screws 1¼-in. long. Carpenter drives and pulls nail to start hole in asbestos-cement siding for wood screw.

SCRAP PIECES (below) of asbestos-cement siding are salvaged and cut into 2-in. batten strips by Black & Decker electric saw equipped with Carborundum Resinoid abrasive disk.

proportional to those quoted for other items.

Accompanying illustrations indicate a number of substitute products used in place of critical materials. In addition to timber employed for framing instead of steel or reinforced concrete, plastic flashing replaced copper, cast-in-place gypsum roof drains took the place of metal gutters, zinc-coated iron downspouts supplanted copper pipe, and all-asbestos heating ducts superseded metal.

Like most war jobs, the project was subject to alteration and expansion during construction. About six months after the award of the original fixed-fee contract, the size of the job was doubled by a supplemental agreement. Despite this expansion, progress on construction was sufficiently rapid during the first ten months, in which the project twice won the Public Works award, to bring various components at the end of that period up to the following degrees of completion: excavation, 82 percent; railroad tracks, 72 percent; storm and sanitary sewers, 83 percent; water mains, 72 percent; concrete, 75 percent; and buildings, 60 percent. This progress was attained with a labor force which numbered 8,700 at the peak and averaged about 5,000, the number employed at the end of the ten months. About 18 months' total working time elapsed before the depot was completed for full occupancy.

FOR CONTRACTORS, job operates under direction of (left to right) WILLIAM E. KLIEFOTH, general superintendent on buildings, CHARLES P. HARTLINE, general superintendent on utilities, and H. B. MADDEN, project manager.
Photo by Truman B. Keener

Building Construction

Although project design is predicated on a useful life of only 20 to 30 years, the buildings are of such substantial construction that their lives unquestionably could be extended, with adequate maintenance, several times beyond the 20-30-yr. base period. With the exception of steel sash, the buildings make minimum use of critical materials. It so happened that steel sash for the job was available from stocks manufactured before steel priorities went into effect.

Columns of all buildings rest on concrete pedestals carried to limestone bedrock at shallow depths below the surface. Foundation walls around buildings, and around the freight-loading platforms flanking the storehouses, likewise are built up from rock. Concrete floors of the 55 storehouses are placed on rolled earth grade.

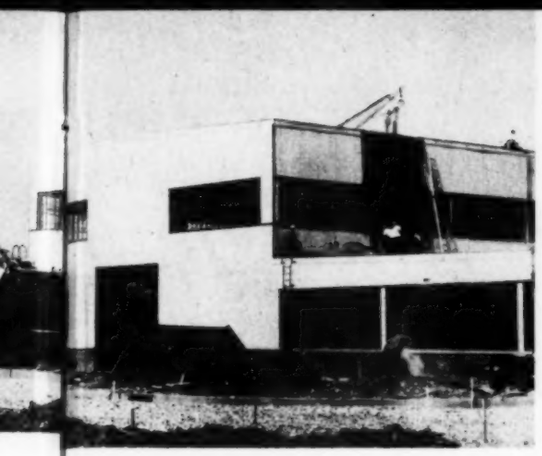
Each of the storehouses is bordered in its long dimension by a railroad track on one side and a truck pavement on the other. Loading and unloading platforms run the full length of these buildings on both sides. Thirteen of the buildings have floors and platforms at freight-car level; in the remainder the floors and platforms are at ground level.

In addition to storehouses, the naval supply depot has ten other buildings, making a total of 65, exclusive of an incinerator. The ten additional structures are an administration building, a cafeteria, a firehouse, a garage, a public works shop, a sewage disposal plant, a train yard office, a locomotive and crane shed, a truck control station and gatehouse, and a scale house.

Features of Storehouses

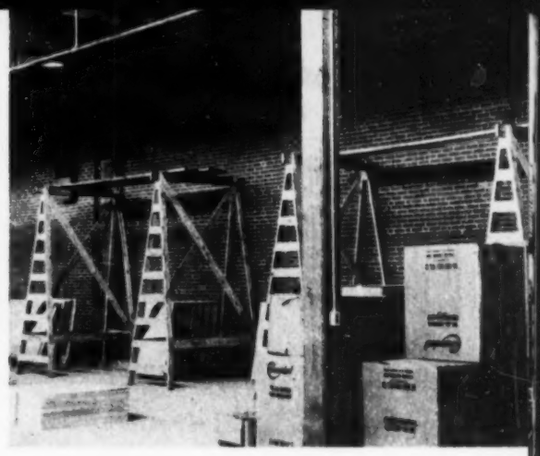
No ammunition or ordnance is stored at the depot. Three classes of storehouses are included in the proj-

(Continued on page 126)

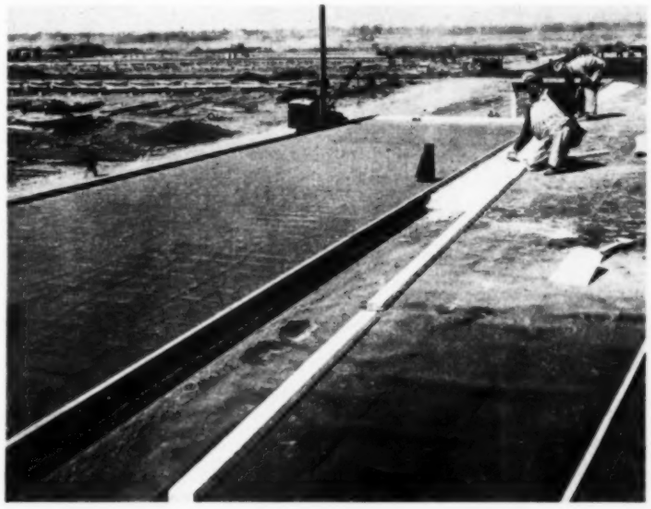


LOCOMOTIVE CRANE, part of supply depot s permanent equipment, unloads roof slag from gondola car and piles it on roof deck. Where slag can be wheeled from dumping point on roof, portable floor hoppers are used to charge material into buggies or barrows.

ALL-ASBESTOS INSULATED AIR DUCTS are substituted for metal in storehouse heating systems. To assemble ducts in place, workmen hang temporary wooden frames from ceiling.

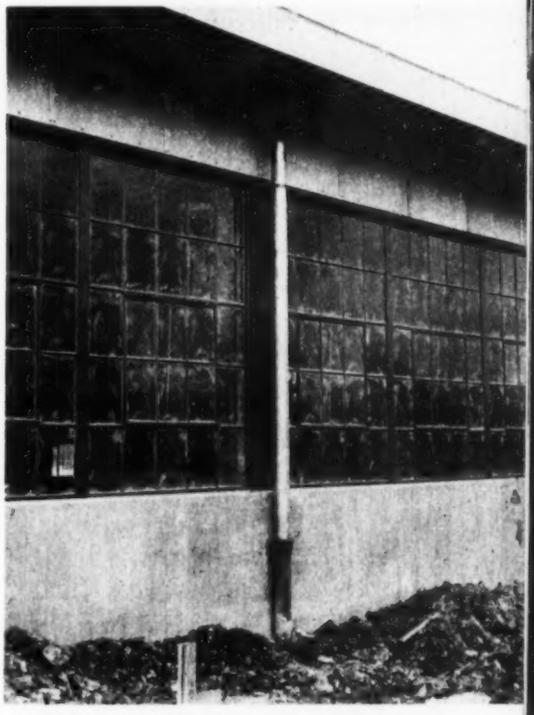


TALL HORSE SCAFFOLDS are used to hang temporary wooden frames in which asbestos duct material (Philip Carey Co.) removed from packages in foreground may be assembled.



POURED GYPSUM is troweled by workmen into canted crickets at roof edge to direct rainwater into downspouts, eliminating use of metal gutters. U. S. Navy Official Photo

PLASTIC FLASHING replaces copper in supply depot buildings. After experience, builders settle on pressed and polished extruded sheet flashing 0.020 in. thick as best for job. Flashing is fastened to wood backing with copper nails.



LEAD-COATED SHEETIRON LEADERS take place of copper pipe originally planned for Navy storehouses. Copper pipe bends, fabricated prior to change of plan, are used in leaders without replacement.

MATERIALS QUANTITIES

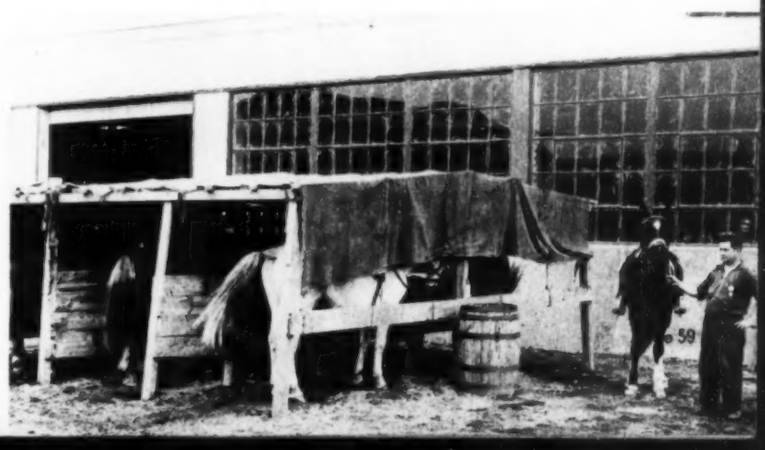
Three Types of Timber-Frame Warehouses — Naval Supply Depot

	GENERAL STOREHOUSE	HEAVY MATERIALS STOREHOUSE	AERONAUTICAL STOREHOUSE
Timber framing, b.ft.	346,792(a)	517,223(b)	664,765(b)
Timber connectors, lb.	2,022		49,032
4-in. split rings, no.	572	11,802	37,147
2⅝-in. split rings, no.	448		
2½-in. split rings, no.		1,984	
4-in. shear plates, no.		2,448	4,212
1-in. round washers, no.	572	496	320
¾-in. round washers, no.	9,138	14,160	22,300
½-in. round washers, no.		504	1,984
3x3x¼-in. plate washers, no.	572	13,005	22,082
¾-in. lock washers, no.		7,874	8,477
½-in. lock washers, no.		434	
¾-in. locknuts, no.		4,940	5,304
Bolts, lb.	13,220	36,123	48,930
Steel angles, plates, straps, lb.	12,069	23,058	46,304
Steel sash, sq.ft.	14,490	18,613	20,000
Wall sheathing, 1x6-in. t. & g., b.ft.	27,000	38,000	87,000
Asbestos-cement siding, sq.ft.	35,000	57,000	90,000
Roof sheathing, 2x8-in., t. & g., b.ft.	330,000	360,000	360,000

(a) In addition, general storehouse has about 45,000 b.ft. of miscellaneous framing with ordinary dimension lumber.

(b) In addition, heavy materials and aeronautical buildings have 49,311 b.ft. in craneway girders plus miscellaneous framing with dimension lumber. In aeronautical building, miscellaneous framing amounts to 68,000 b.ft.

NEITHER TIRES NOR GASOLINE (below) are needed for this four-legged transportation system which carries job supervisors over 800-acre site.



Tractors and Barges Make *Land-Water Trek* Through Northwest Wilderness to Deliver Supplies for Building *Oil Pipe Line* Serving Alcan Highway Defense Areas

TEMPESTUOUS PELICAN RAPIDS on bend in Slave River compel Army Engineers to resort to 16-mi. portage over trail route through wilderness for transporting material for oil pipeline project.

TRACTOR TANDEM hauls 65-ton barge around rapids from Fort Fitzgerald to Fort Smith where it is refloated to carry equipment to pipeline site.

BULLDOZER LEADS CARAVAN of equipment, boats and 4-in. pipe for Norman Wells pipeline to re-embarkation point at Fort Smith.

NEAR END OF 16-MI. TREK (below) equipment is about to be reloaded on to barges for journey across Great Slave Lake and down Mackenzie River to Fort Norman.

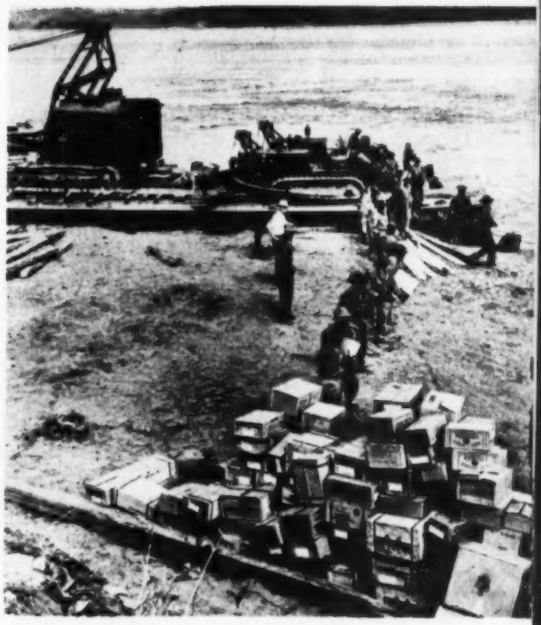
SEAMLESS 4-IN. STEEL PIPE AND EQUIPMENT (below) are unloaded from trailers at Fort Smith landing and reloaded on to barges for continuation of trip northward by river.

DIESEL-POWERED TRACTORS provided the key to solving the problem of delivering over land and water in the wilderness of the Northwest and Yukon Territories of Canada, equipment and supplies for building an oil pipe line to supply defense areas served by the Alcan Highway, completed last year under the direction of the Corps of Engineers, U. S. Army, with the aid of the Public Roads Administration, as described in *Construction Methods* for January, p. 64. Known as the Canol Line, the project involves the construction of a 4-in. pipeline of 4-in. welded steel tubing starting at the Fort Norman air fields in Northwest Territory and extending a distance of 520 mi. to Whitehorse on the route of the Alcan Highway in the Yukon, with a 110-mi. branch to Skagway on the Alaskan coast. From Edmonton, Alberta, the material started its northward journey by rail to Fort McMurray and thence proceeded by river barge and overland to its destination. A feature of the trek was the necessity of making a 16-mi. portage between Forts Fitzgerald and Smith to avoid the dangerous Pelican Rapids on the Slave River. The journey was completed by proceeding northward on the Mackenzie river to the Fort Norman oil fields. At the south end of the portage the barges had to be beached, loaded on trailers and hauled by Caterpillar diesel tractors over a hastily constructed pioneer route and refloated after their 16-mi. trek at Fort Smith. The route extended through unbroken wilderness including crossings of muskeg swamp seldom traversed even by native hunters and trappers.

The accompanying photographs illustrate some of the transportation difficulties involved in delivering the necessary pipe and construction equipment over land and water to its destination for starting the oil pipe line from Fort Norman.

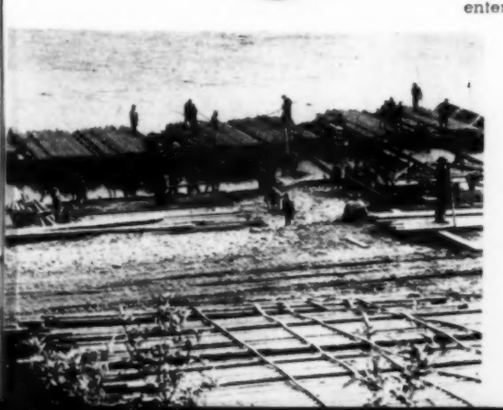
DRAGLINES AND TRACTORS that will lay strategic pipeline are carried by barge to Northwest Territory oil field.

COL. THEODORE WYMAN (right) originally in charge of project for U. S. Engineers, checks over maps of route with Lt. Col. T. A. ADCOCK at Fort Smith.



FOOD SUPPLIES are delivered aboard barge loaded with Caterpillar tractors and other heavy-duty equipment before starting last lap of trip to Norman Wells.

65-TON BARGES (below) make big splash as they enter Slave River after overland haul.



Maintaining Roads

By SIR FREDERICK COOK
C.B., D.S.O., M.C., M. Inst. C.E., F.S.I.
Late Chief Engineer to Britain's Ministry of War Transport; Member of the Council, Institution of Civil Engineers.

COMPLETE RECONSTRUCTION with heavy grading equipment has been necessary in some areas to widen roads and provide surfacing that can take punishment of military traffic.
British Combine Photo

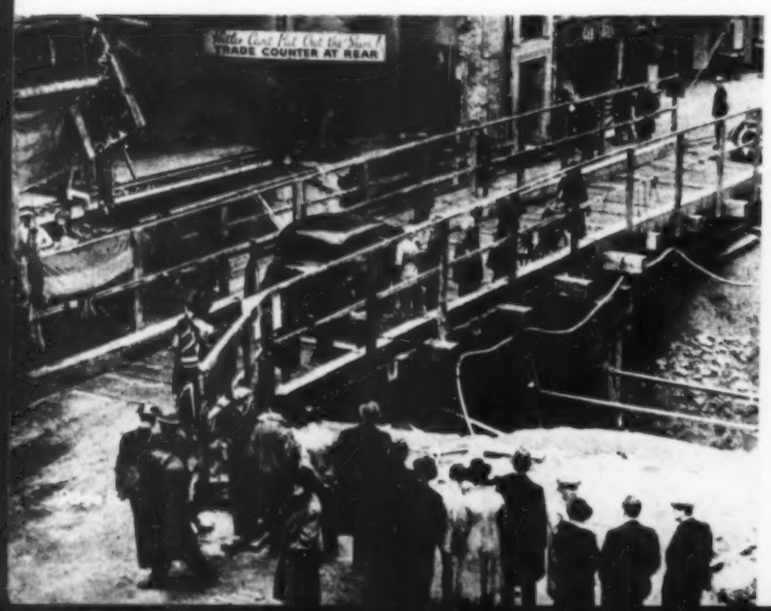
MANHOLE COVERS AND OTHER FITTINGS have taken most punishment on urban roads more from lack of drivers' skill than from type of vehicles. Here mobile laundry in convoy travels to isolated areas.

FUNDAMENTALLY ROAD MAINTENANCE METHODS differ little whether the traffic is predominantly military or civil, provided, of course, there is no marked difference in types of vehicles employed, and that their drivers possess the same skill and exercise equal care. With the exception of tanks, referred to later, the real criterion is weight or volume, or both, and this is a matter of degree.

A great deal of work on road improvement and strengthening has been carried out in Britain during recent years. At the outbreak of war, Britain's public roads — though in many parts narrow and tortuous — were generally in good structural condition, and practically all of traffic importance had impervious surfaces. Since then, staffs of highway authorities — county and urban authorities alike — have been greatly reduced in number, and their efforts mainly devoted to essential maintenance. Careful attention to drainage, immediate repair of defects in the road crust, and timely surface dressing come definitely within this category. On the whole, roads have stood up surprisingly well.

The principal difficulty has been with rural roads normally subjected to light traffic of, say, less than 500 tons per day, which with little, if any,

SPECIAL PROBLEMS (below) have, of course, been caused by bombs. Here hastily built bridge over bomb crater in London street is opened to traffic, thanks to emergency construction by Royal Engineers.
British Combine Photo



GREATEST DESTRUCTION (below) to roadways has been caused by crawler tracks near tank parks and training grounds. Units shown are Bren gun carriers of new mechanized Reconnaissance Corps.

FOR BRITAIN'S ARMY

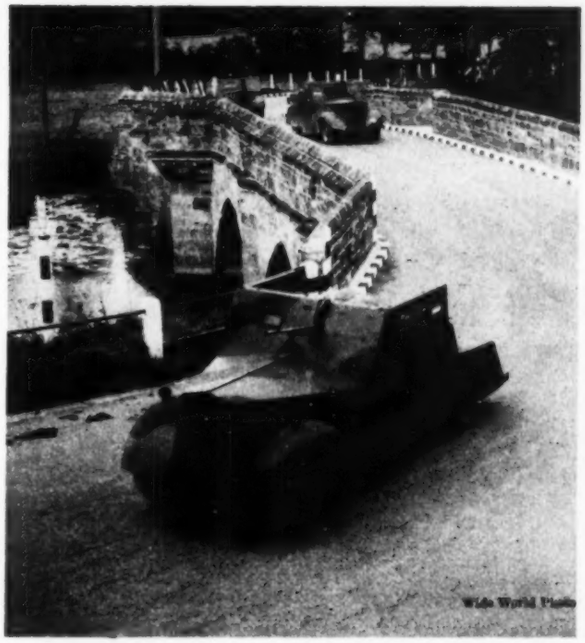
prior warning to highway authorities, have become principal means of approach to camps, airfields or other military establishments. There is a considerable mileage of this character, the roadways of which are 12 ft. or less in width, with a narrow grass margin on one or both sides bordered by ditches which may be from 2 to 4 ft. in depth. Passage of vehicles in both directions leads to enroachment on and subsequent destruction of verges [shoulders] and collapse of ditches, with resultant breaking up of the haunches of the roadway.

In such cases complete reconstruction is necessary. Where there is sufficient room between the fences, reconstruction has generally been accomplished by widening the roadway to take two lanes of traffic, the added width being obtained by narrowing the grass shoulders and piping-in the ditches. The method of constructing the roadway is governed by the nature of the available materials, care being given to drainage and foundations. Surfaces can be of concrete or bituminous macadam — the latter if there is no need to provide for the turning of vehicles with straked tires. Experience has shown the importance of giving highway authorities the longest possible notice of the intention to construct military establishments likely to attract heavy additional traffic—especially in rural areas—so that necessary works of road improvement can be carried out beforehand.

The problem of urban roads presents other features. Damage done in built-up areas is due rather to what may be called fittings than to the

(Continued on page 118)

RURAL ROADS normally subjected to small volume of light traffic have become main thoroughfares for military vehicles such as those used by motor cyclists shown here on reconnaissance tour.



BRIDGES (right), on the whole, have been found capable of carrying excess traffic loads, even of heaviest tanks. "Beaverettes" used by Britain's new Reconnaissance Corps are shown here passing over small masonry arch bridge.

CRAWLER-TREAD VEHICLES (below) cause little damage on good concrete roadways, but play havoc with macadam surface, especially when making sharp turns.

Wide World Photo

British Combine Photo

THE JOB JESTER

CARTOONS DRAWN FOR CONSTRUCTION METHODS

"Lookit Sir Galahad! That's the sixth one he's helped across that mud puddle today!"

"You'll have to speak to Junior, dear. He's subcontracted his piano practice!"

"It's the wife's idea. She worries about me!"

Press Assoc. Photo

WINDMILL WASHING MACHINE takes advantage of Aleutian breezes to turn out spotless "G.I.'s" for inventor, Private Earl Krech, and his buddies with no more labor than holding bucket steady while wooden paddle wheels, receiving power through chain and sprocket, beat clothes clean. Inventive soldier rode wave of popularity until electricity was supplied to encampment.

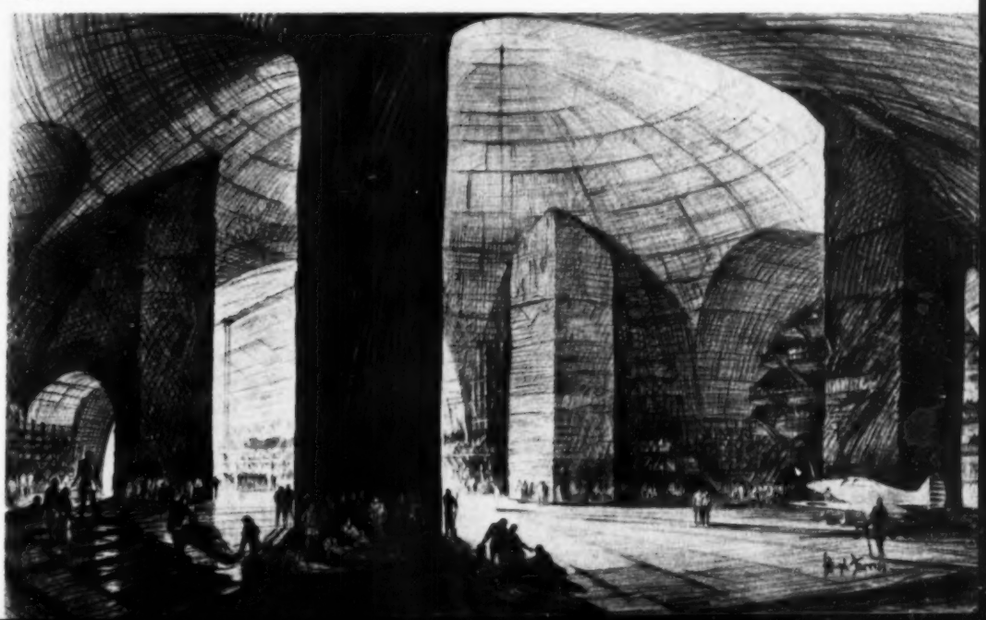
JOB oddities

CHINESE WOMEN RAILROAD BUILDERS lay roadbed for track, carrying stone in woven reed baskets suspended from bamboo strips slung across their shoulders. Baskets are fitted with trip release, permitting dumping of contents in desired locations. Press Assoc. Photo

"BRIDGE OF SIGHS" FOR ENEMY is this temporary structure built in jig time over swamp at Army air base by engineers from portable open-mesh grating mats laid on wooden stringers and strong enough to support heavy equipment. Transports and glider planes flew in construction materials for bridge. Product of Irving Subway Grating Co., mats are ordinarily used for "pocket airfields" at fighting fronts and for emergency roadways. Here, American officers are explaining construction technique to British general.

NO STARGAZER is ALEX McGEORGE, veteran construction superintendent of firm of Barrett & Hilp, of San Francisco, here shown at an unusual angle while he was using transit to plumb timbers on building project for Westinghouse. He has since been transferred to Barrett & Hilp contract for building twenty-six reinforced concrete barges for U. S. Maritime Commission.

ROCK CLIFFS OF JERSEY constitute potential refuge in event of enemy bombing raids on New York City, according to plans drawn up by New York contractor, George J. Atwell, calling for a gigantic bombproof shelter to be excavated in hard-rock Palisades on west bank of Hudson River. No critical materials would be needed to tunnel through 200-ft. high cliffs to Weehawken meadows 1½ mi. back from riverfront, according to Mr. Atwell. His scheme would provide shelter for large numbers of people, art treasures, airplanes, and even manufacturing plants by driving tunnel 200 ft. wide and 100 ft. high provided with rock pillar supports.



BELL HOLE WELDING GANG line up long section of pipe at end of line in place. Mud at this location was knee-deep in spots. Trucks had to be pulled by tractors. This section of the line is not wrapped because soil is not corrosive.

FIRING-LINE ROLL WELDERS complete job of tackers and joint three lengths of pipe into one section. First pass is made with 3/16-in. Fleetweld 5 electrode at 200 amp.; second pass is made with 1/4-in. Fleetweld 5 electrode at 325 amp.; third pass is made with 5/16-in. Fleetweld 5 electrode at 375 to 400 amp. When completed weld is "penny wide" and "nickel high". Each roll welder marks his weld with stencil. Careful inspection discloses any pin holes and these are rewelded by roll welder before he leaves that section of pipe. Welders used by this gang are Lincoln shield-arc S.A.E. 400-amp. capacity. These are towed from section to section by tractor.

TYING-IN of a section is completed **(below)**. Two bell-hole welders produce these welds with 3/16-in. electrodes using 200 amp. Welding machines used for most of this bell hole welding are 200-amp. shield-arc special.

Arc-Welding Technique

Applied to Construction of 1,340-Mile "Big Inch" Pipeline

SOME OF THE WELDING TECHNIQUES employed in constructing the "Big Inch," largest oil pipeline ever built, are illustrated in the accompanying photographs from the Lincoln Electric Co., of Cleveland, Ohio, producer of arc-welding equipment. With a capacity of 300,000 bbl. of oil per day, the line, linking Texas with the Eastern Seaboard, is of 24-in. O. D. seamless steel pipe of $^{3}/_{8}$-in. wall thickness. It consists of two main sections the first, already completed, extending 531 mi. from Longview, Texas, to Norris City, Ill., and the second, now under construction, continuing for an additional 809 mi. from Norris City to Phoenixville, Pa., with branches feeding refinery areas of Philadelphia and New York City.

The line between Texas and Illinois was finished on a rush schedule by seven pipeline contractors employing 4,000 men and progressing at a combined rate of about 6 mi. of pipeline laid per day. Eleven of the country's leading oil companies participated in the project, which was directed by War Emergency Pipelines, Inc., with B. E. Hull serving as vice president and general manager. The pipe was delivered in lengths of 38 and 44 ft., weighing 3,800 and 4,200 lb. respectively. The weight per linear foot of

CLAMPING HOLDS SECTION OF PIPE to end of line. Bar wedges are hammered into place, bringing bevelled ends of pipe together.

TWO TRACTORS carry 150-ft. section of welded pipe to end of line for lining up and subsequent welding operations.

MEN OF TYING-IN CREW stand on ends of pipe to help bring them into line. Welders are here tacking joint after it has been properly lined up and clamped.

LINE-UP AND TACKING CREWS of firing-line gang work at top speed. Here pipes, mounted on dollies, are lined up, clamped and tack-welded ready for firing-line roll welders.

the 24-in. O. D. size was 94.62 lb. The handling of pipe of this size and weight required the use of extra heavy-duty side-boom tractors, often counterweighted to prevent tipping over.

Electric arc-welding was done both by the "stovepipe" method, where pipe sections are joined on cribbing directly over the trench, and by the "roll weld" method, where three or four pipe lengths are welded into a single section alongside the trench, rolled over and lowered to place.

The Big Inch completion schedule calls for oil to be flowing into eastern refineries and storage terminals by early summer. Capacity operation at a rate of 300,000 bbl. daily, according to Deputy Petroleum Administrator Ralph K. Davies, shortly after the start of full Texas-East Coast pumping operations. Twenty-five pumping stations will drive a continuous stream of oil through the 1,340-mile welded pipeline.

FIRING-LINE WELDER (right) makes last pass of roll weld. Wing guard shown protects arc and facilitates welding operations.

COMPLETED ROLL WELD (below) joins sections of 24-in. O.D. seamless steel pipe for "Big Inch."

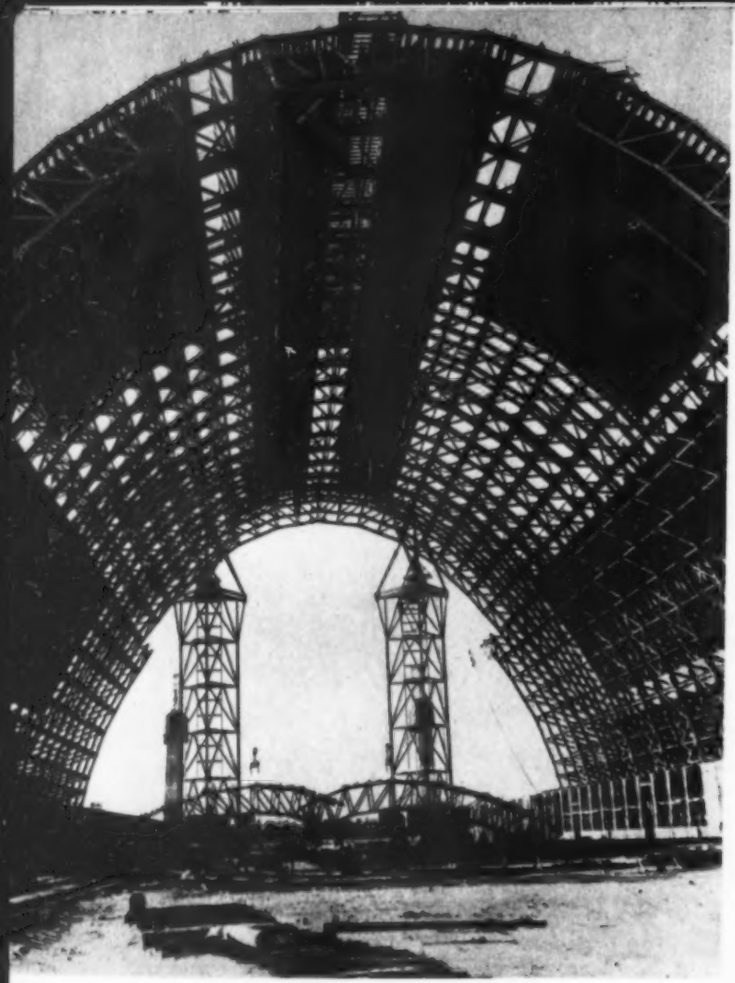
REPAIRS ARE MADE on cable reel of tractor. Flange casting broke and was replaced by building new flange from ¼-in. mild steel plate cut in form of two semicircles to fit around hub of reel. Two semicircles then were welded together, and finally flange was fillet welded to hub on both sides of flange.

BELL-HOLE WELDERS complete tie-in weld, with clamps in place in previous illustration.

GREAT LENGTH OF PIPE is suspended as bell-hole welders complete necessary connections.

HOW They Did It

CONSTRUCTION DETAILS
For Superintendents and Foremen

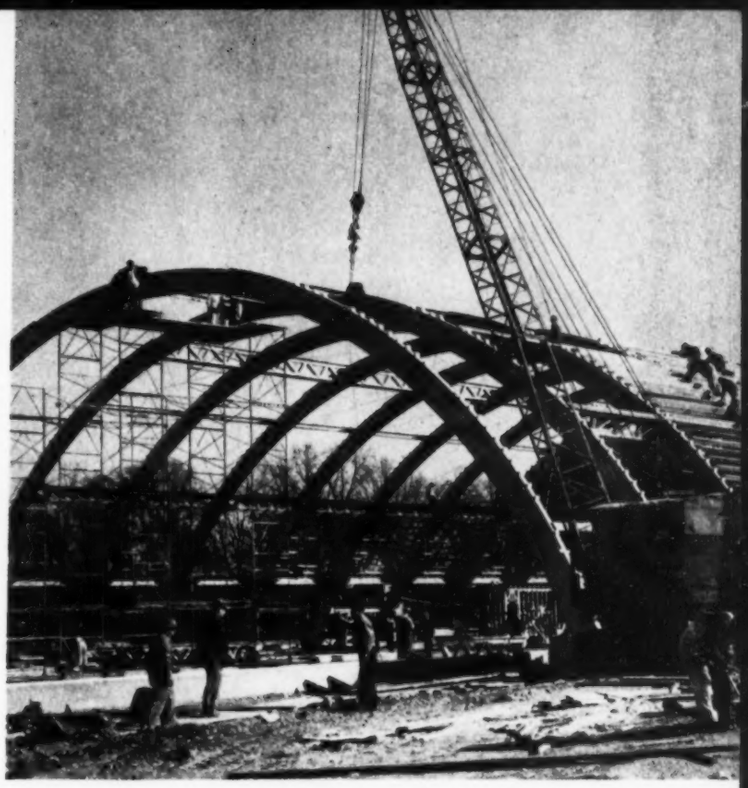


STIFFLEG DERRICKS mounted on tall towers erect huge timber arches of 237-ft. span and 153-ft. rise for Navy blimp hangar 1,000 ft. long. Framing is done with Teco split-ring timber connectors to produce joints of maximum strength.

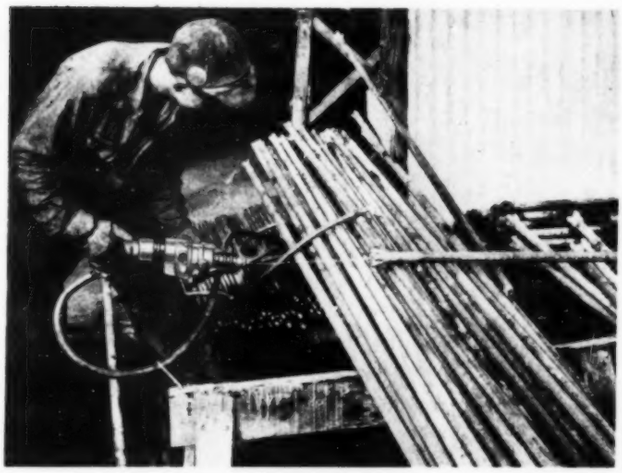
EXCAVATOR RIG BECOMES RAIL PULLER in recent U.S. Treasury steel scrap drive when hydraulically controlled P & H machine fitted with special front-end attachment salvages 1,700 ft. of street car track in 4 hr. in Rhode Island city. Rail-pulling unit consists of welded steel frame, vertical members of which are attached to boom hoist sheave shaft and base to car body axle of excavator. Suspended from frame is rail grab which attains pulling force from two 3-sheave block reeving to which it is attached. In operation, tierods are cut, rails are burned in 30-ft. sections and horizontal member of frame holds down ties while rail is extracted without removing spikes from ties. When moving frame, front end is raised with boom hoist and unit is dragged over ground.

CORRUGATED PIPE SEWER (below, left and right) is suspended from old railroad bridge 1,700 ft. long for crossing Vermilion River at Danville, Ill. To maintain uniform grade, adjustable hangars are used to suspend 10-in. Armco asbestos-bonded, asphalt-coated corrugated pipe from bottom of deck girders 120 ft. above river. Vertical support consists of threaded rod; wind load was offset by added horizontal ties where rods were long. Light-weight pipe was fabricated in 24-ft. lengths furnished with standard 12-in. wide corrugated coupling bands. Hangars were placed 12 ft. apart, one adjacent to each coupling band and one midway between joints. Elbows were inserted in pipe where varying width of bridge or clearance of abutments required changes in line. Installation was made by Allan Hickman, Danville contractor, under direction of J. E. Epler, manager, Danville Sanitary District.

DOORS THAT OPEN AND CLOSE with ease in all kinds of weather and under all temperature conditions have been made for 15 years by Springfield, Mass., Municipal Water Works out of Johns-Manville ebony asbestos and hung in all buildings of water supply system. Corrosion-free doors are built in three layers, with center layer framed in same way as exposed wood frame on ordinary wood panel door, according to Elbert E. Lochridge, chief engineer, Springfield Water Works. Entrance shown here has double door, with inner door framed in ordinary way, frame being exposed on outside of panel.



CRAWLER CRANE lifts prefabricated laminated timber arches into place on 120x625-ft. drill hall at Navy's Camp Bainbridge, Md., being built by Chas. H. Tomkins Co., of Washington, D. C., general contractors. Arch ribs are composed of 37 pieces of 1x8-in. lumber glued together under pressure to give net section 30 in. deep by 7½ in. wide. Ribs are less than half circle with 63½-ft. radius, arch crown being 41 ft. above tie between pedestals and 39 ft. above finished floor. Arches were fabricated in two sections 74 ft. long around the arc and joined by a light splice. Ribs, 16 ft. c. to c. have no interior support and are set on poured concrete pedestals. Longitudinal stiffening is provided by four timber trusses and four T-beams between adjacent arches.



CLEANING OUT BIT ENDS of hollow drill steel **(left)** is here done by fitting Ingersoll-Rand pneumatic drill with length of thin wire inserted in opening.

STRONG "SHATTER-PROOF" LADDER (left and right) designed for safety by The Austin Co., engineers and builders, of Cleveland, Ohio, uses three laminated 1x2's for uprights instead of the 2x4's ordinarily employed. Rungs are 1x4's secured by bolts between chalks and covered by thin nailer strips. Ladder 16 ft. long has about same weight as ordinary construction ladder of 2x4's but, because of its unusual construction, is nearly twice as strong.

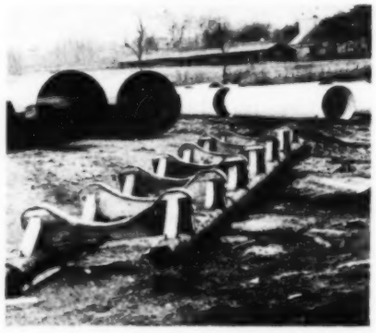
OXYACETYLENE WELDER (below) at Henry J. Kaiser's Oregon Shipbuilding Corp. yard demonstrates proper care of war-critical hose by coiling it on cylinder truck, brought as close as practical to the work. Hose serving Airco torch is kept straight and is protected from damage.

WHITEWASHED PIPE delivered by truck-trailer from fabricating shop is unloaded on right-of-way by P&H crane on Mack truck. Cleared right-of-way stretches across hill in background in direction of Springfield, 12 mi. distant from this point.

SHOP-FABRICATED ANGLE SECTION of 59-in. I. D. ⅜-in.-wall pipe is picked up in two slings by bridle from load line of truck crane. This section is 34 ft. long, 4 ft. longer than uniform 30-ft. straight sections, and weighs about 4 tons.

All-Welded Main

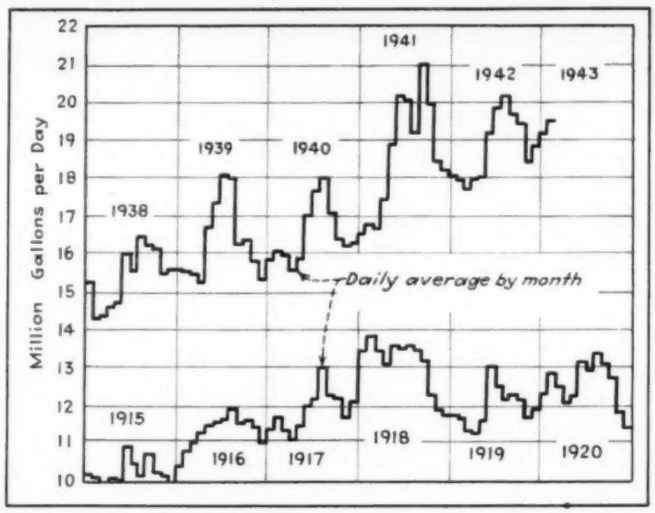
Is Rushed to Boost Water Delivery to War-Expanded Industrial Area



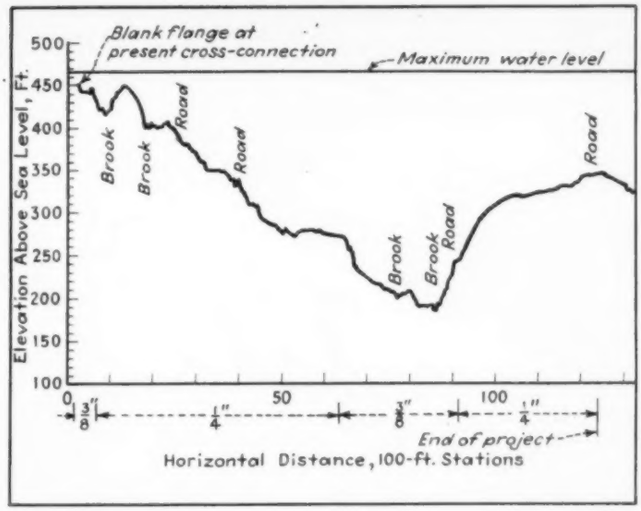
TIMBER SLED made of two piles with cradles padded by sections of old fire hose is used behind tractor to move pipe sections along line.

BLAST HOLES (below) in outcropping of hard mica schist are drilled by Cleveland wagon unit with Timken detachable bits. Drilling 12-ft. holes, machine completes 200 ft. in 8 hr. and on ordinary drilling makes 150 to 200 ft. Air consumption is slightly more than 200 cfm. at 100-lb. pressure.

DIGGING FROSTED GROUND (below) to depth of about 2 ft., cable-controlled LeTourneau bulldozer on Caterpillar 96-hp. diesel tractor starts trench cut for Lorain 1¾-yd.-capacity dragline equipped with 1½-yd. bucket. In exposed places, winter frost penetrated to 4 ft.



WAR-ACCELERATED GROWTH in water consumption makes it necessary for Springfield, Mass., Municipal Water Works to increase 22-mgd. capacity of existing supply system. Daily average by months as shown on chart tells only part of story. Actually many days, and occasionally the daily average for a week, have exceeded 30 mgd. In 1942, rainy summer held down water use by residential consumers.



BY PARALLELING present 42-in. supply line with supplemental large-diameter pipe for 13,000 ft., as shown on this profile, Springfield will have benefit of 29 mgd. delivery capacity after July 3. With 29,000,000-gal. storage in clear water reservoir, this capacity will take care of peak summer demands. Note how 1/4-in.-wall and 3/8-in-wall pipe, improvised out of smaller-diameter second-hand tubing, is distributed in auxiliary main to accommodate varying hydrostatic pressures.

UTILIZING LARGE-DIAMETER PIPE refabricated out of smaller sizes, as described in *Construction Methods* last month, the Springfield, Mass., Municipal Water Works and its fixed-fee contractor for field construction, Daniel O'Connell's Sons, Inc., Holyoke, Mass., are laying 13,000 ft. of all-welded steel auxiliary main, made up of nominal 50- and 60-in. sizes, parallel to an existing 42-in. conduit 40,000 ft. long which delivers water from filter beds on the east slope of the Berkshires to a reservoir on top of a traprock range 6 mi. west of the city hall. Speed is essential in completing the auxiliary main if the municipal supply system is to satisfy the peak summer demands of its highly industrialized service area, containing many war-born and war-expanded plants. A contract time limit of 150 working days requires that the supplemental main be connected into the present line, ready for service, by July 3. Laying of pipe in the trench and field welding of joints began on April 1, and current progress assures completion well within the specified time.

Since the inception of the national defense program in the fall of 1940,

SUPPLEMENTAL WATER MAIN is laid under supervision of: (left to right) JAMES B. PORTER, associate water engineer; ELBERT E. LOCHRIDGE, chief engineer, Springfield, Mass., Municipal Water Works; and DANIEL O'CONNELL, JR., president, Daniel O'Connell's Sons, Inc., Holyoke, Mass., contractor.

ACTIVE DIRECTION of field construction for contractor rests with FRANK D. O'CONNOR (left), general superintendent, and RICHARD M. AHERN, superintendent, Daniel O'Connell's Sons, Inc.

LOGS USED FOR BLAST PROTECTION are removed from trench by Northwest 3/4-yd. clamshell crane.

DECOMPOSED MICA SCHIST (below) on top of ledge rock is hammered loose by two Worthington paving breakers. Blast holes in foreground were cut by pair of Worthington 175 hammer drills which contractor's drillers crowd with 150 to 175 cfm. of air. Timken detachable bits are used on drill rods.

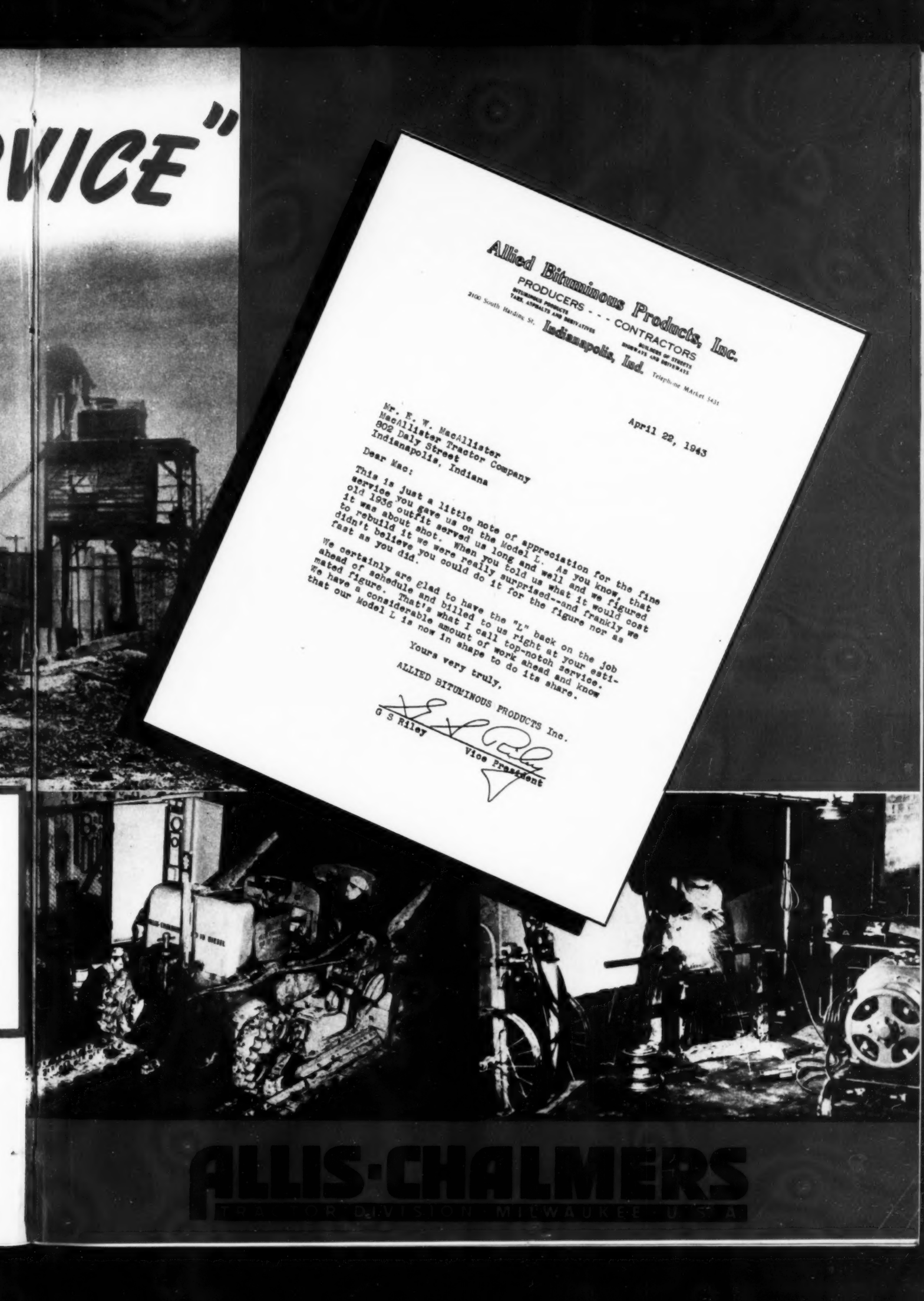
"TOP NOTCH SERVI

Mr. G. S. Riley of Allied Bituminous Products, Inc., proudly stands beside his rejuvenated, 1936 Model L, now back in shape for many more hours of tough service. Repairs on this outfit included reground valves, new master clutch, new steering clutches, new bearings in transmission, new final drive pinion, repairing final drive, replacing seals in 4 rollers and turning pins and bushings. A new motor kit was also installed.

HANDLING repair or rebuild work the way it should be handled . . . getting the job finished on time . . . and at lowest possible cost . . . that's Top Notch Service! It's the kind an Allis-Chalmers dealer recently gave to Allied Bituminous Products Company on a tractor overhaul job . . . the kind your A-C dealer is equipped to give to you.

His factory-trained mechanics are skilled in their work . . . have specially adapted tools for efficiently tearing down tractors and other road-building equipment and for reassembling them in a hurry. His shop is equipped with hoists for quickly lifting heavy sections. Machining facilities are readily available. Working quarters are of the best — ample and clean — assure careful handling of delicate Diesel parts. Replacements are genuine Allis-Chalmers parts. Welding worn or broken sections, cleaning and painting are all a part of his service.

His experienced judgment in sizing up a job enables you to know beforehand about what has to be done and what it will cost. Why not have your Allis-Chalmers dealer check YOUR equipment NOW . . . it will pay you many times over! Take care of your machinery and it will take care of you!



Allied Bituminous Products, Inc.

PRODUCERS - - - CONTRACTORS

BITUMINOUS PRODUCTS
TARS, ASPHALTS AND EMULSIFIERS

BUILDERS OF STREETS
HIGHWAYS AND DRIVEWAYS

3100 South Harding St. **Indianapolis, Ind.** Telephone MArket 5431

April 22, 1943

Mr. E. W. MacAllister
MacAllister Tractor Company
802 Daly Street
Indianapolis, Indiana

Dear Mac:

This is just a little note of appreciation for the fine service you gave us on the Model L. As you know, that old 1936 outfit served us long and well and we figured it was about shot. When you told us what it would cost to rebuild it we were really surprised--and frankly we didn't believe you could do it for the figure nor as fast as you did.

We certainly are glad to have the "L" back on the job and billed to us right at your estimated figure. That's what I call top-notch service. ahead of schedule. That's what I call top-notch service. We have a considerable amount of work ahead and know that our Model L is now in shape to do its share.

Yours very truly,

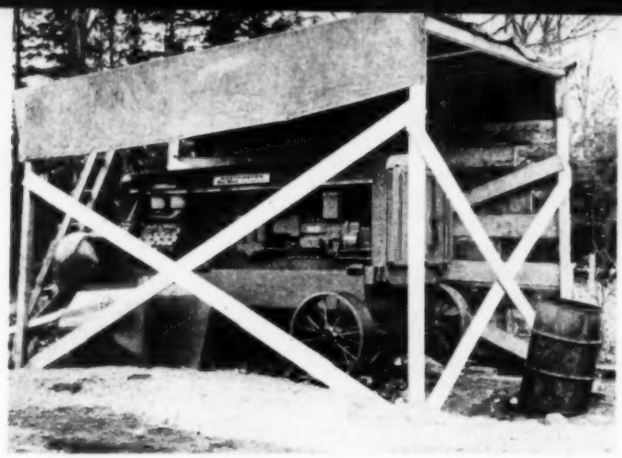
ALLIED BITUMINOUS PRODUCTS Inc.

G S Riley

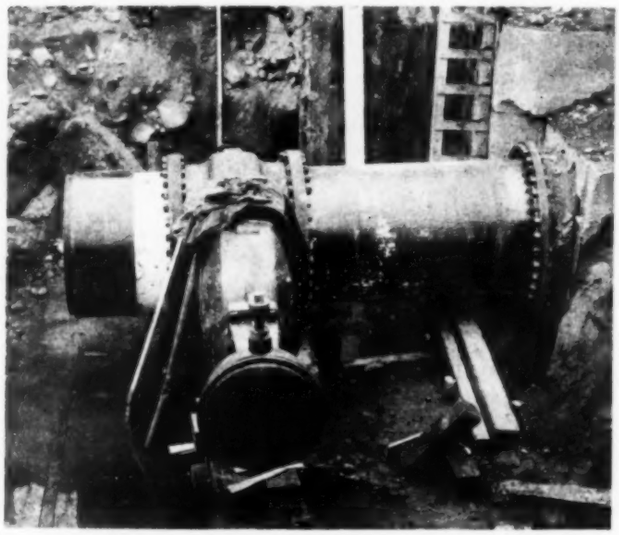
Vice President

ALLIS-CHALMERS
TRACTOR DIVISION · MILWAUKEE · U.S.A.

STEEL SHEETPILE COFFERDAM at largest stream crossing is set and driven by Bucyrus-Erie 41B steam crane.

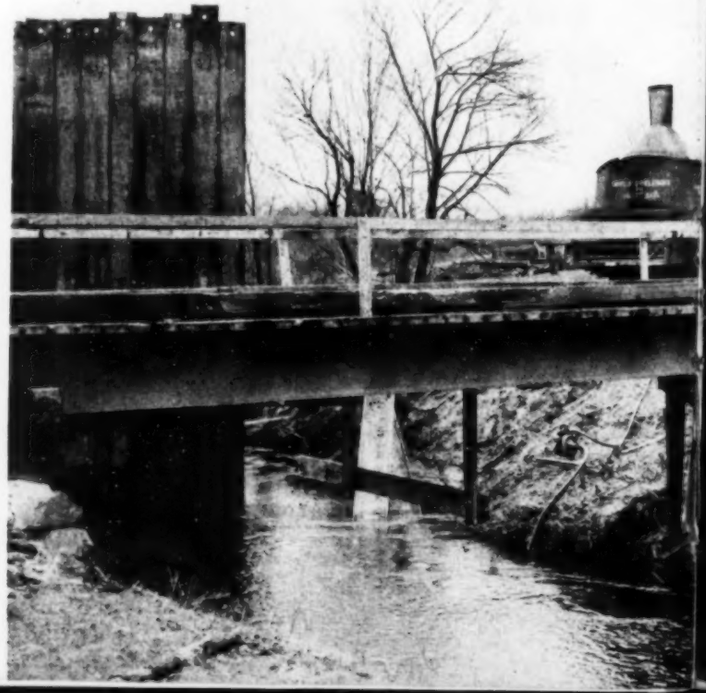


RATED CAPACITY of 500-cfm. Worthington compressor driven powered by Caterpillar D13000 diesel engine is exceeded on this job, where machine often furnishes air to wagon drill and two 175 hammer drills, in addition to running 2-in. Chicago Pneumatic sump pump.



AT HEAD OF AUXILIARY MAIN, gate valve and steel special are made ready for connection to new line.

TIMBER FRAME (below) lines up sheetpiles 30 ft. long for cofferdam at stream crossing. Retaining wall of steel sheetpiling holds opposite bank of diversion channel to carry stream around cofferdam being constructed. Double-acting hammer weighing 5,000 lb. puts down piles at long boom radius from crane. For shorter radius, 7,000-lb. hammer is used.



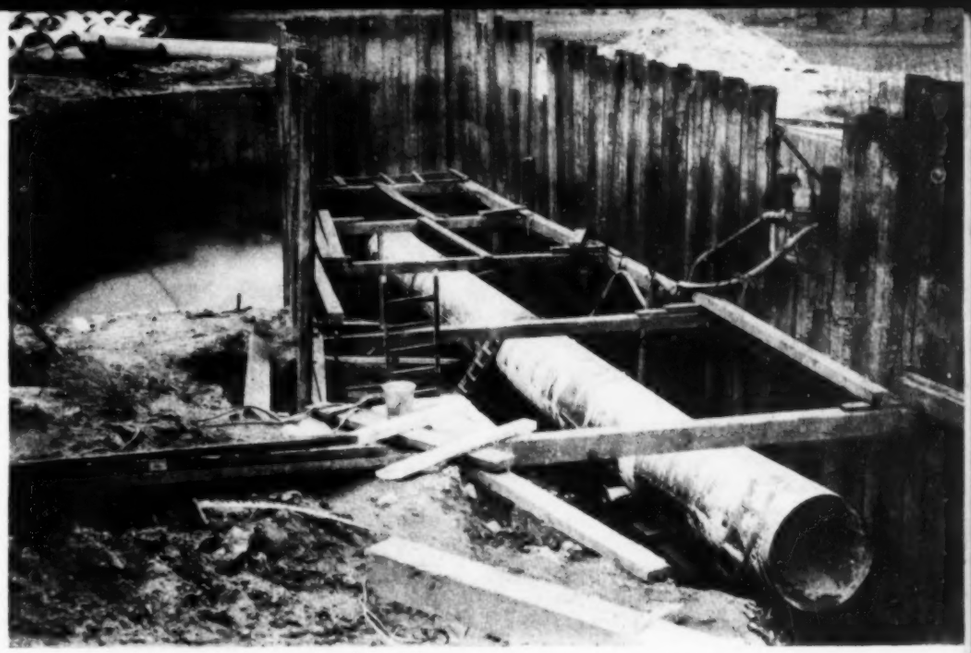
Springfield's water consumption has risen rapidly, as indicated by an accompanying graph. The waterworks engineers took prompt note of this rise and made ready to execute a plan which had lain on the shelf for years, awaiting in increased demand for water. This plan called for construction of 40,000 ft. of 52-in. I. D. main paralleling the existing 42-in. line.

Approval of the 40,000-ft. project was given informally by the War Production Board after the heavy water consumption during the summer of 1941 had demonstrated the necessity for a greater supply, and the work was scheduled for construction in 1942. With the tightening of steel allocations for construction after Pearl Harbor, WPB reversed its preliminary decision and refused to allow new pipe for the Springfield job.

This reversal put the waterworks in a predicament from which Elbert E. Lochridge, chief engineer, and his associates quickly devised a means of escape. The manager of the Walsh Holyoke Steam Boiler Works, which had contracted to fabricate the 52-in. I. D. pipe from ⅜-in. plate, now disallowed by WPB, was dispatched by plane with the inspecting engineer consultant for the waterworks to scour the country's second-hand pipe yards for available tubing which might be rerolled and refabricated into needed sizes. The water engineers had determined to make and lay as much pipe as could be obtained in an auxiliary main to increase volume delivery by reducing friction losses. Pipe installed in the parallel conduit had to be of a size and quality to fit into eventual completion of the remainder of the 40,000-ft. supplemental line with 52-in. I. D. pipe.

In Pennsylvania the fast-traveling scouts found 8,000 ft. of 30-in. O.D. pipe piles, ⅜-in. wall thickness, made in 1940 and never driven. The pipe was bar-welded, with one longitudinal seam in 90 percent of the stock

(Continued on page 131)



INSIDE STEEL SHEETPILE COFFERDAM, sections of 59x⅜-in pipe are laid on cribbing for welding at connections. Considerable jacking is required in fitting up joints between these heavy sections.

TO BE USED DURING CONSTRUCTION (below) and later, when waterworks maintenance equipment may need to travel line, contractor builds semi-permanent bridge incorporating six 21-in. I-beams 30 ft. long on timber pile bents.

PRINCIPAL STREAM CROSSING (below) on line of auxiliary main requires steel sheetpile cofferdam being driven by steam crane at foot of slope.

POWER GUNS in form of 15-ft.-diameter welded steel penstocks to serve electric generating units in 375,000-kw. power plant protrude from downstream face of Shasta Dam, which towers to height of 602 ft. and will contain 6,000,000 cu.yd. of concrete. There are five penstocks ranging in length from 807 to 935 ft.

SKY RIDE is in prospect for this Shasta Dam workman as he signals cable operator to pick up 30-ton section of penstock for delivery between dam and powerhouse.

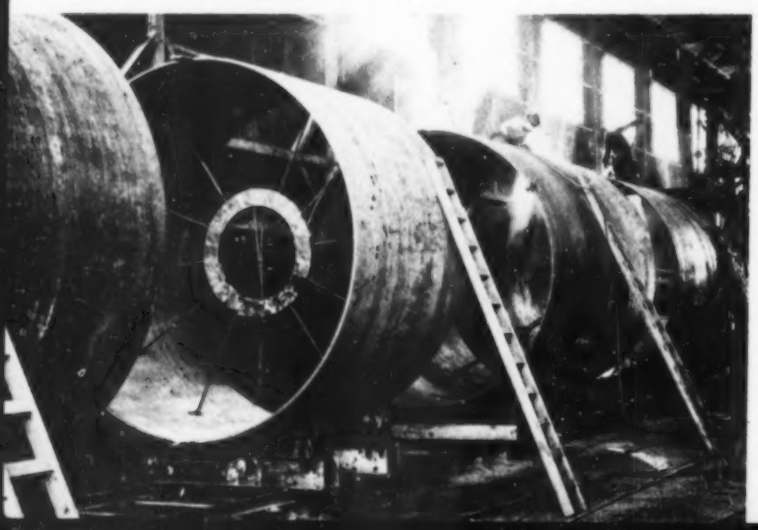
Big Steel Penstocks In 30-Ton Sections Are Placed in *Shasta Dam*

AT SHASTA DAM, U. S. Bureau of Reclamation flood control, irrigation and power project on the Sacramento River in California, Pacific Constructors, Inc., are bringing to completion the 602-ft. high, 6,000,000-cu.yd. concrete structure by the installation of five huge all-welded steel penstocks which will carry water from the reservoir to generating units in the 375,000-kw. powerhouse. Each penstock is 15 ft. in diameter and is made up of sections of steel pipe 20 ft. long weighing 30 tons. The penstock lines range in length from 807 to 935 ft. and are fabricated by the Western Pipe & Steel Co. at a plant 1 mi. below the dam. Steel is shipped in by rail in 10-ft. quarter-sections and electrically welded into 20-ft. long pipe sections. The accompanying photographs illustrate various phases of the penstock fabrication and placement operations.

For the U. S. Bureau of Reclamation Ralph Lowry is in charge of the project as construction engineer.

WEIGHING 30 TONS, a 20-ft. long section of 15-ft.-diameter welded steel penstock, too big to be handled by railroad, is transported from fabricating shop to dam on special truck-trailer and lifted to place by cableway.

PENSTOCK ASSEMBLY LINE (below) is located in shops of Western Pipe & Steel Co., 1 mi. downstream from dam. Here steel plate is welded into pipe sections 15 ft. in diameter and 20 ft. long, each weighing 30 tons. Spiders are inserted in completed sections to prevent deformation during handling and shipment.



Present and Accounted For · · · A PAGE OF PERSONALITIES

HEADING NEW ENGLAND ROAD BUILDERS ASSOCIATION for current year is B. HOWARD HENDERSON, elected president at recent annual meeting. Mr. Henderson is vice president of Warren Brothers Co. and of Warren Bros. Roads Co., of Cambridge, Mass. He has been a director of association since 1938 and vice president for last three years.

ARMY-NAVY "E" AWARD for designing and building Rocky Mountain Arsenal at Denver several months ahead of schedule and at saving of few million dollars on original estimate, is presented to representatives of following contracting firms who were responsible for achievement: (left to right) RICHARD WALBERG, partner in Swinerton & Walberg of San Francisco; D. M. PRAYTOR of C. G. Kershaw Contracting Co. of Birmingham; EZRA B. WHITMAN, senior partner in Whitman, Requardt & Smith of Baltimore; C. E. DANIELS, district superintendent for E. I. du Pont de Nemours & Co. of Wilmington; J. L. CHERRY, partner in H. A. Kuljian & Co. of Philadelphia, and C. A. HARWICK, vice president of The H. K. Ferguson Company of Cleveland and New York.

FIVE TIMES PRESIDENT of Queens, Long Island, N. Y., Chamber of Commerce is ARTHUR A. JOHNSON, head of The Arthur A. Johnson Corp., engineers and contractors, of Long Island City. Mr. Johnson has found time to discharge his Chamber of Commerce duties in addition to directing activities of his firm on such projects as Bermuda Army air base and Letterkenny Arsenal, Chambersburg, Pa. Other important projects handled by Mr. Johnson's organization have been subway construction in Brooklyn and Queens, New York, Quabbin Dam in Massachusetts and grading site of New York World's Fair, involving moving of 8,000,000 cu. yd. of earth. Mr. Johnson is a past president of the General Contractors' Association of New York and vice president of The Moles, composed of tunnel and heavy construction men.

COMPLETION OF BIG HOUSING PROJECT for workers of Moore Drydock Co. in Oakland, Calif., wins congratulations for HARRY HILP (wearing light suit), member of contracting firm of Barrett & Hilp, of San Francisco. In group, left to right, are: JOSEPH A. MOORE, chairman of board, Moore Drydock Co.; Mayor JOHN F. SLAVICH, of Oakland; MR. HILP, and D. W. FERNHOWT, of U. S. Maritime Commission.

NEWLY ELECTED HEAD of Kentucky Association of Highway Contractors is W. P. PAYNTER of Middlesboro, Ky.

REELECTED PRESIDENT of Associated General Contractors of Missouri is R. R. RINEY, member of firm, O'Dell & Riney Construction Co., of Hannibal and Kirkwood, Mo., which is now engaged on grading operations on two large war projects and on three improvement contracts on strategic highway system.

WPB CONSTRUCTION DIVISION CHIEF is FERDINAND J. C. DRESSER, of Cleveland, who occupies office recently relinquished by William H. Kahler. Mr. Dresser, formerly of Dresser Co., was in charge of engineering section of Army Specialist Corps, where, with rank of Colonel, he selected engineering personnel qualified for commissions.

BOX CAR REPAIR SHOP is ready to service crawler crane in Chicago yard of Donald B. MacNeal.

Box Car Repair Shop Brings Service To Machine

DRILL PRESS in box car shop is operated through line shaft by Ford gasoline motor.

ORDINARILY IN REPAIRING contractors' equipment the machine is brought to the shop. After observing that high-priced machinists spent 2 hr. a day walking back and forth from a shop 150 ft. from the repair yard, Donald B. MacNeal, Chicago renter and repairer of heavy machinery and used equipment dealer, conceived the idea of fitting up a shop in a box car and bringing the shop to the machine. He bought a railway box car, 40 ft. long and 10 ft. high, with double doors, from the Rock Island R.R. and equipped it with sufficient tools and parts to make in the field all ordinary repairs on a crane, shovel or other heavy machine. The car has the latest McB trucks and can be dispatched to any part of the country by rail in double quick time. The accompanying pictures show the car in MacNeal's yard at Loomis and 122nd St., South Chicago, Ill.

In one end of the car on one side is a Model A Ford engine belted to a line shaft to drive a hacksaw, grinder and buffer, drill press, compressor and lathe. On the other side is a work bench with vise and on the walls are tools, mostly wrenches, arranged according to size. In the opposite end of the car one side is occupied by small parts for cranes and the other by a large array of bins for bolts, nuts and small standard parts. A grease barrel is located at the end and a bench with pipe vise on the other side. In the center is an anvil and forge and a depot coal stove for winter use.

Two 4x4-ft. portable platforms the height of the car floor provide steps and easy access to a crane being repaired. The car is wired for electric lights but Mr. MacNeal has not yet put in a generator, feeling that current can nearly always be obtained from local sources.

SPARE PARTS. nuts and bolts are stocked in bin compartments.

PORTABLE PLATFORMS with steps afford easy access to machine needing repairs. DONALD B. MACNEAL (wearing white trousers) discusses repair job with his mechanics.

ARMY LEASES *Alaska-Canadian Railroad*

THE WHITE PASS AND YUKON ROUTE, a shortline railway extending from Skagway, Alaska, to Whitehorse, Yukon Territory, Canada, has been leased by the United States Army for the duration of the war, the War Department announced today.

The line provides rail connection between the coast and the Alaskan-Canadian Military Highway, which passes through Whitehorse, headquarters of the Northwest Service Command. The Alaskan Highway, as previously announced, is under construction by the United States Corps of Engineers and is expected to be completed for military use about December 1, 1942.

The Military Railway Service, of which Brigadier General Carl R. Gray, Jr., is Commanding General, with headquarters at St. Paul, Minn., is already operating the railroad, with Major John E. Ausland, Corps of Engineers, in charge. Technical supervision is under General Gray, who negotiated the lease for the War Department. The entire operation is under the jurisdiction of the Northwest Service Command, Brigadier General James A. O'Connor, Commanding General.

Whiteman "ONE-MAN" Machines Solve Labor Shortage Problems on Concrete Slab Work

Whiteman Machines conserve your manpower — multiply the work capacity of even "green" hands — the machines do the work.

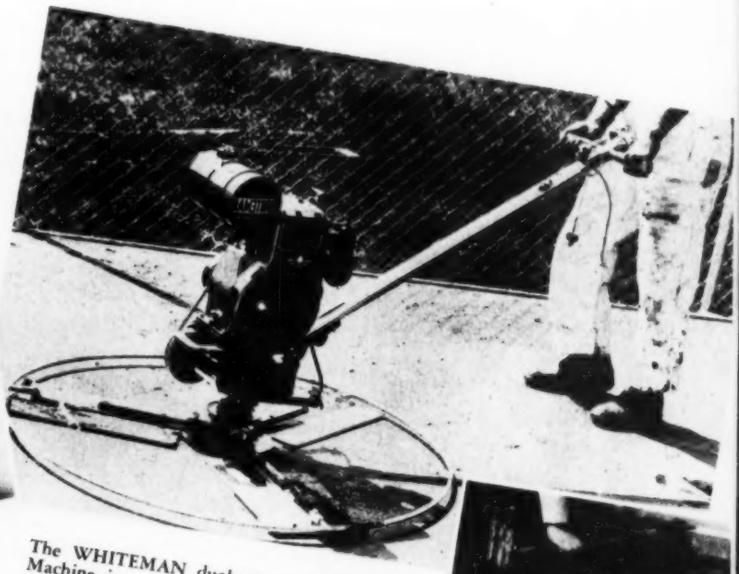
For Screeding your concrete slab work, use the WHITEMAN Rodding Machine. ONE-MAN operated, the machine with power-driven rod sticks (screeds) making 5 in. transverse strokes on the header boards, simultaneously levels and compacts the distributed pour, handling 4 cu. yd. in 5 minutes. WHITEMAN Screed Stake Caps also save time and materials. Easily and quickly adjusted to the proper level, they are just as easily retrieved for many re-uses.

For Floating use the WHITEMAN dual-purpose ONE-MAN operated, Finishing Machine. With the broad, flat, "Heavi-Duti" trowels on the machine, ONE-MAN can cover 1,000 sq. ft. in 15 minutes. The power-driven, rapidly rotating trowels produce a perfect float finish.

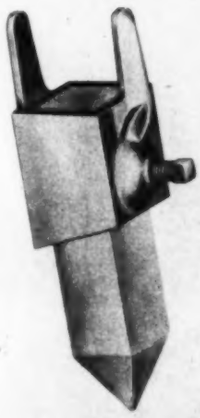
For Finishing use the same WHITEMAN Finishing Machine. Simply attach the light, adjustable-pitch "Finish" trowels and ONE-MAN again can cover 1,000 sq. ft. in 15 minutes. Without any handwork necessary you get a level slab, denser, harder and longer wearing.

WHITEMAN can help you solve your manpower shortages — for further information write or wire for the name of your nearest distributor.

ONE-MAN pulls the WHITEMAN Rodding Machine over the distributed pour. The power-driven screeds, riding on the header-boards, level and compact the mix. One man can handle 4 cu. yd. of low slump mix in 5 minutes.



The WHITEMAN dual-purpose Finishing Machine is used for Floating and Finishing. The easily interchanged, power-driven trowels bring up the surface in a hurry. ONE-MAN can cover 1,000 sq. ft. in 15 minutes leaving a harder, denser, longer wearing surface without any handwork necessary.



WHITEMAN Screed Stake Caps save time and labor. You can make up your own 2 x 2 wood stakes on the job, cutting them to lengths needed to fit ground conditions. Drive the stake and then adjust the tough, malleable iron cap to the proper level. Use either 2 x 4 or 2½" pipe screed. Caps give long service — you can reclaim them and reuse time and again.

For small work use the WHITEMAN Hand Tamper. A denser floor is obtained with more even distribution of finer aggregates, leaving a "fat" sufficient for finish. With a good mix, dry topping is unnecessary. This inexpensive, light-weight, adjustable and collapsible Tamper will save much time on small work. Write or wire today for full informa on.

Whiteman MANUFACTURING CO.

3249 Casitas Avenue — Los Angeles, California

HAISS

BIGGER PAYLOAD BUCKETS

For TRENCHING ...the Narrow-bowl HI-POWER in ⅜ and ¾ yd. sizes is a master workman.

For EXCAVATING ...a full line of HI-POWER Buckets with variable reeving for up to 7:1 closing ratio.

For REHANDLING ...the Haiss MULTI-SHEAVE in a full range of sizes. Fast, sturdy and long lived.

Haiss has the right bucket for your particular job, engineered all the way to give you bigger pay-loads through improved design and construction. A Haiss Bucket gives your crane a chance to break its own best performance records. Every Haiss Clamshell is built to do its particular type of work better. Fifty years of skill and experience in manufacture back it up.

★ *Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.*

GEORGE HAISS MANUFACTURING CO., INC.
139th St. & Canal Place, New York

CONSTRUCTION EQUIPMENT NEWS

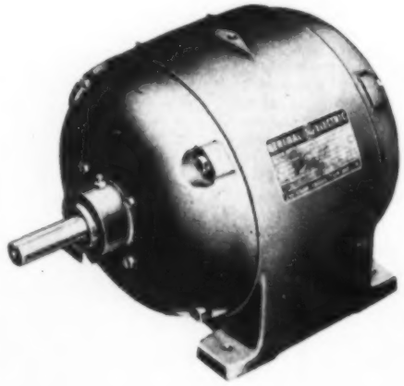
Review of Construction Machinery and Materials for JUNE, 1943

CORRUGATED ASPHALT SIDING is a non-critical, emergency material, especially designed for construction of factories, warehouses, storage and machine sheds and many other structures. Material consists of two sheets of heavy felt, each soaked in recently

developed resino-bituminous saturant, held together with high melting point adhesive and corrugated. Subjected to severe, practical tests, it is claimed by its manufacturers to have proved its worth as a product that will stand up in all sorts of weather. Life of siding may be indefinitely prolonged by applying Certain-teed asbestos roof coating immediately after it has been placed, repeating treatment every few years thereafter, depending upon climatic conditions. – **Certain-teed Products Corporation, 120 S. La Salle St., Chicago, Ill.**

★ ★ ★

TOTALLY INCLOSED MOTORS, most recent addition to group of GE Tri-Clad units are now available in both polyphase, 60-cycle, induction type and single-phase, 60-cycle, capacitor type, and are especially designed for use under conditions where abrasives, chemicals, rain, snow and excessive dirt are encountered. Polyphase motors are furnished in frame sizes 203 to 225. They include ½, ¾ and 1 hp. at 900 rpm.; ¾, 1 and 1½ hp. at 1,200 rpm.; 1, 1½ and 2 hp. at 1,800 rpm., and 1½ and 2 hp. at 3,600 rpm. New motors have all basic features of Tri-Clad group: triple protection – against physical damage, electrical breakdown and normal operating wear and tear. In addition, all parts of motor enclosures – frame, end shields and conduit boxes – are cast iron, thus offering exceptional resistance to rust, corrosion, accidental blows and rough usage. Also leads are permanently incased in compound in cast-in pocket in stator frame, thus preventing liquids from seeping into motor. Still further protection is provided in form of rotating labyrinth seal, which prevents dirt, oil or water from entering bearing housing. Motors are wound with Formex wire. – **General Electric Co., Schenectady, N. Y.**



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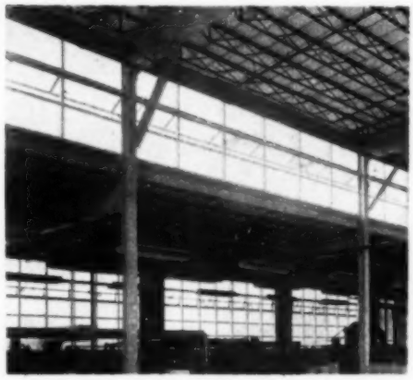
BAR WINDOW, departure from conventional unit type of sash, is made up of horizontal glass-receiving bars carried in continuous unbroken lines across vertical members of sturdy proportions. Vertical members are slotted to receive and engage bars. System is said to be remarkably simple and to permit



designer wide latitude in general arrangement and in type of ventilating panels. Ventilators are shop assembled. All other members are shipped in bar form for assembly at job site. Expense of handling, shipping, storage and painting, prior to assembly, is thus greatly reduced. Glass panes from 30 to 44 in. wide by 17 in. to 24 in. high are used. Simplicity of design makes these windows not only pleasing in appearance but their use also results in reduction of cleaning and maintenance costs. System was first developed with aluminum in combination with steel and later was made available entirely in aluminum. At present wood construction is proving equally satisfactory. These windows are especially recommended for use in factories, schools and public buildings of all types. – **E. K. Geyser and Company, 200 Cedarhurst St., Pittsburgh, Pa.**

Rigidity

TO KEEP YOUR GRADERS ROLLING FOR VICTORY...

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition —check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

If you need help or advice on any of the above, see your local Adams distributor.

***RIGIDITY is necessary to accuracy! That's why gun barrels are held rigidly in position by elaborate mountings and supports—just as the blades of Adams Motor Graders are rigidly supported in all cutting positions . . . Stout design and costly, machine-finished construction shut out sloppy, inaccurate blade action. That's why experienced operators prefer an Adams when smooth, accurate cutting is necessary to meet strict grading specifications . . . RIGIDITY is another of the many features you'll like in Adams Motor Graders when Victory permits you again to buy equipment for peace-time projects!

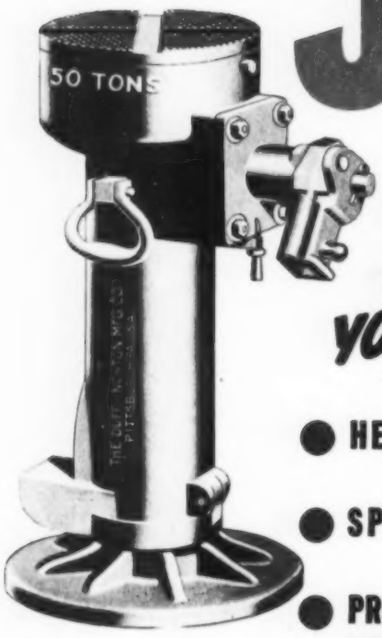
J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

Adams

ROAD-BUILDING AND EARTH-MOVING EQUIPMENT

DUFF-NORTON JACKS



Stretch YOUR MANPOWER!

- **HELP EACH MAN DO MORE WORK**
- **SPEED THE TOUGHEST JOBS**
- **PROVIDE MECHANICAL MUSCLES FOR LIFTING, LOWERING, PUSHING, PULLING**

Today you need every available tool to help your men keep rolling without a hitch. Make sure that you have plenty of Duff-Norton Jacks—for they provide "mechanical muscles" to speed your construction jobs. These sturdy, dependable, easy-to-operate Jacks are made for every type of lifting, lowering, pushing and pulling. Make full use of them.

EVERY JACK USER SHOULD HAVE THESE DUFF-NORTON AIDS

Catalog 201

A handy 56-page illustrated data book on Duff-Norton Jacks. Gives sizes, prices, capacities. You need a copy.

Safety Poster

For hanging-up on the job wherever Jacks are used. Gives your men valuable safety hints.

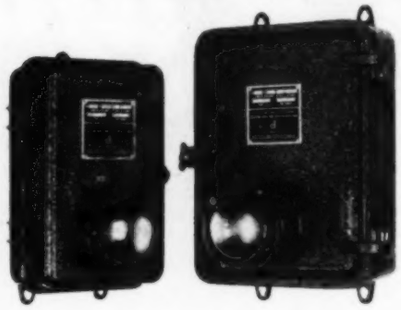
Maintenance Manual

Reserve your copy now of this important 16-page manual on Jack maintenance, soon to be published!

THE DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PA.

Canadian Plant: COATICOOK, QUE. District Representatives in Principal Cities

PHOTO-ELECTRIC PROTECTION SYSTEM projects fence of invisible light over distances as great as 1,500 ft. and gives instant local or central station alarm if an intruder enters protected area. Designed to meet government requirements, equipment has unusual operating range and is especially suited to protection of harbors, yards, docks, industrial properties, airports and similar large areas. Because this equipment responds only to frequency of light emitted from light source, it



is not affected by other artificial light or by daylight. This allows extreme sensitivity, enabling system to function over greater range than could heretofore be covered by photo-electric controls and at same time guarantees complete stability of operation. If invisible infra-red light is not required, operating range of system exceeds 2,000 ft. Within light source, fan driven by gearless, brushless motor, serves as light chopper to produce rapidly fluctuating light of desired frequency, and also cools heavy-duty lamp, assuring long life. Once invisible beam of light projected to receiver is momentarily broken, alarm circuit latches in operation. An additional safety feature is that either power or tube failure will cause alarm circuit to operate as though light beam had been broken. Receiver and light source are of rugged construction, built for unlimited service-free operation and are supplied in weather-proof housings. Offered with these units is an auxiliary latching relay with reset button. Equipment is designed for operation on 105 to 125 v., ac.—**Photoswitch, Incorporated, 77 Broadway, New York City.**

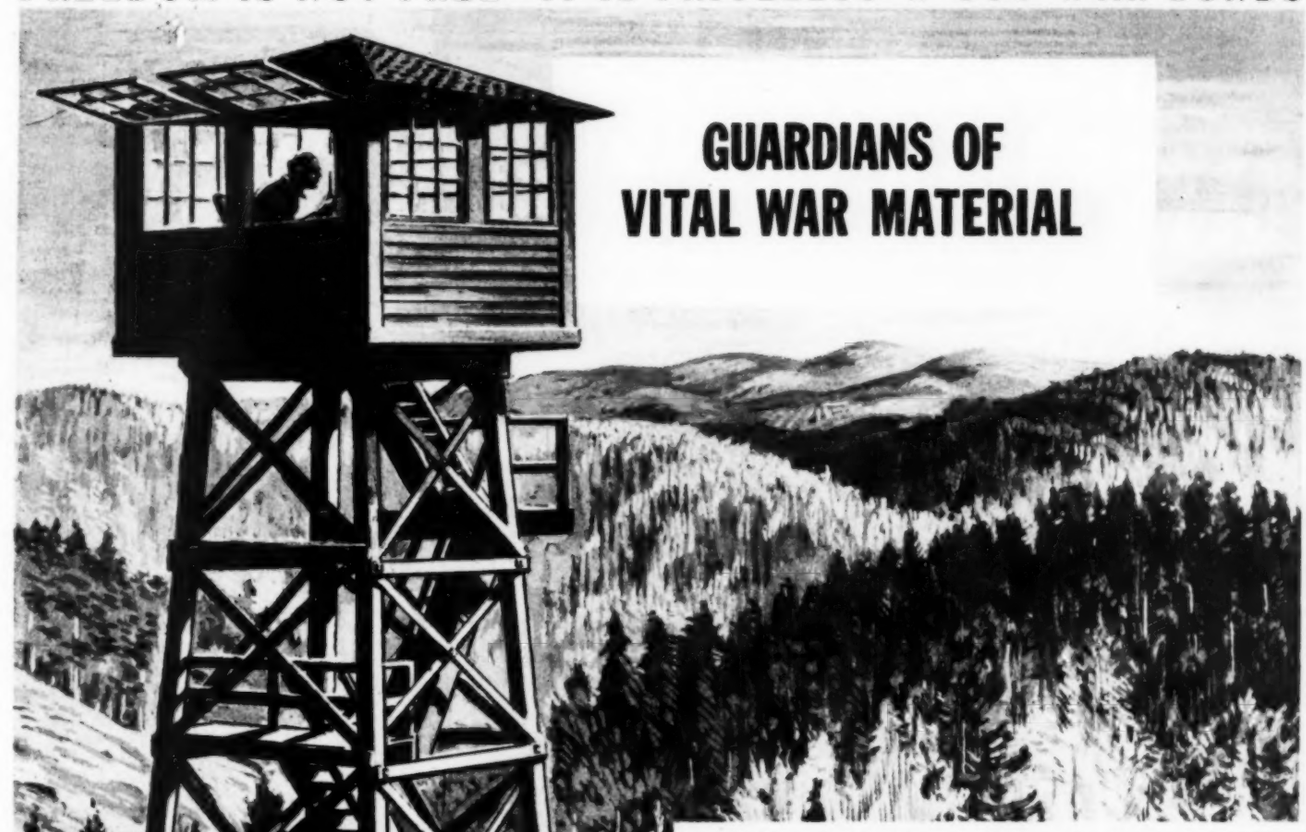
★ ★ ★

INDUSTRIAL AC. ARC WELDER is now available in seven heavy-duty and four intermittent duty models with range of capacities for handling production welding under continuous operation. Specific WSR (welding service

range) ratings of these machines are: heavy duty—50 to 270 amp.; 60 to 375, 90 to 500, 100 to 625, 125 to 750, 150 to 900, and 200 to 1,200; intermittent duty: 20 to 185 amp., 20 to 235, 20 to 285 and 20 to 335. Setting and control of current manipulated by one simple easy-to-operate adjustment.—**Welder Division, Harnischfeger Corp., Milwaukee, Wis.**

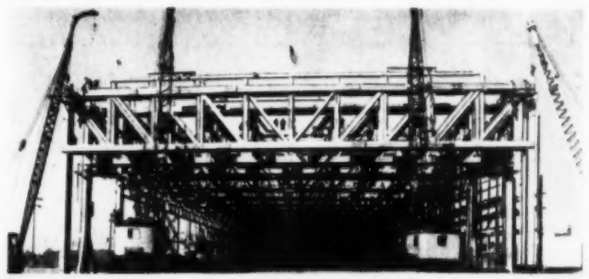
FREEDOM IS NOT FREE—IT IS PRICELESS ★ *BUY WAR BONDS*

GUARDIANS OF VITAL WAR MATERIAL



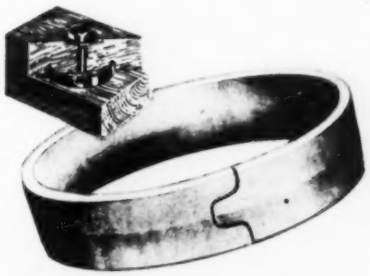
WOOD GOES TO WAR
An MGM Technicolor short by James A. Fitzpatrick.
Ask your theater when you can see it.

Timber Builds Great Plants for War and Peace



A section of the giant, all-timber assembly plant of the Douglas Aircraft Company, just opened for operations. Architect-Engineer-Manager, The Austin Company, Chicago.

Engineers, Architects, Designers, Builders in every field of industry now are using engineered timber for heavy duty structures. The TECO Timber Connector System made this possible. You, too, can design in timber with TECO. Write for our literature today.



The ***TECO*** *Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood . . . brings the full structural strength of lumber into play.*

TIMBER ENGINEERING COMPANY
NATIONAL MANUFACTURERS OF ***TECO*** *TIMBER CONNECTORS AND TOOLS*
WASHINGTON, D. C. **PORTLAND, OREGON**

GUARANTEED
LIFETIME VALVES

JUST ONE REASON why these prominent users bought DAVEY COMPRESSORS

- Consolidated Gas Co. of New York
- Gulf Oil Corp.
- Illinois Bell Telephone Co.
- State of Ohio
- Portland Water District
- City of Seattle
- Southern California Gas Co.

DAVEY Compressor Co.
KENT, OHIO

$11.52 a mile saved . . .

WHEN DIGGER TEETH WERE HARD-FACED WITH COAST METALS

WHEN one mid-western construction company changed to Coast Metals for hard-facing the teeth of its digger bucket, it reported several noteworthy economies. The teeth showed greater wear-resistance. So much so that re-facing was necessary only every six miles instead of every three miles as formerly required. This saving amounted to $11.52 a mile.

On another job, Coast Metals Hard-Faced digger teeth gave over 12 weeks' service where 3 weeks previously had been the limit. On still a third job, Coast Metals teeth excavated 130,000 feet in sandy soil before re-facing was again needed.

By making dipper teeth, grader blades, rolls and hammers in crushing equipment, tamps on sheepsfoot rollers and other parts exceptionally resistant to abrasion, impact and wear, Coast Metals Hard-Facing lengthens equipment life several times. It is readily applied by the acetylene welding torch or electric arc *to any ferrous metal.* Write us for the correct rod to solve *your* problem.

COAST METALS, INC.
Plant and General Offices: Canton, Ohio
Executive Offices: New York, N.Y.

COAST METALS
hard-facing weld rods

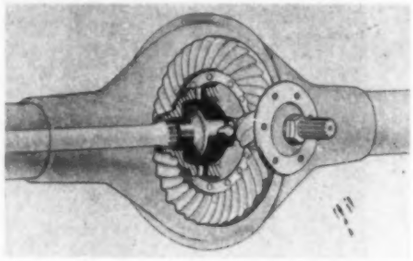
YOUR EQUIPMENT'S LIFE PRESERVER AGAINST WEAR

ASBESTOS-CEMENT PRESSURE PIPE called "Eternit" for use in waterworks, drainage and irrigation systems and in many branches of industry is recommended to users because of its easier and more economical installation, its smooth walls which assure high carrying capacity by reducing friction to minimum, and because of elimination of electrolysis and tuberculation. New product is created by patented extrusion process, which, in addition to providing density and strength, insures uni-

form measurements and smooth surfaces, both inside and out, without machining. If necessary, pipe can be cut with hacksaw in field and coupled immediately without machine preparation ordinarily required at such joints, said to be a time and labor saver and an aid to utilization of short lengths. Pipe is made of a mixture of asbestos fiber and Portland cement and is not subject to rust. A non-conductor of electricity, it is unaffected by stray ground currents and may be safely laid contiguous to electric light and power lines without danger of galvanic corrosion, regardless of type of soil or extent of moisture present. Immune to tuberculation and other forms of internal corrosion frequently caused by various ingredients in liquid carried, pipe is said to maintain full-sized smooth passage, eliminating expense of periodic cleaning or increasing pumping pressure to compensate for reduced waterway. Made in standard lengths of 13 ft. and in diameters up to and including 6 in. For the present, manufacturer states, it is available only in Eastern seaboard states. **—The Ruberoid Co., 500 Fifth Avenue, New York City.**

★ ★ ★

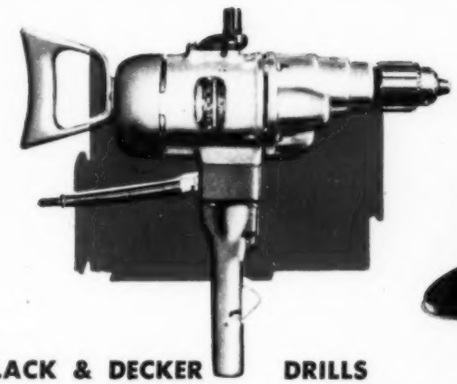
AUTOMATIC-LOCKING DIFFERENTIAL is now standard equipment in 2½-ton six-wheel drive Navy truck. This unit, known as Marine Six by Six, is designed to provide unusual tractive ability under extremely difficult conditions encountered in Marine activities. Elimi-



nates wheel spin and gives positive traction in mud, sand, snow or ice. When one wheel is on some surface where it is unable to exert tractive effort, it does not spin, as would happen with ordinary type differential. Instead, it locks and drive is transmitted to opposite wheel, permitting vehicle to come out of difficult situation under its own power. Manufacturers claim that not only has this differential advantages from a commercial standpoint, so far as trucks are concerned, but it also has value from a safety standpoint because of elimination of skids due to wheel slip. **—Thornton-Tandem Co., Grinell Ave., Detroit, Mich.**

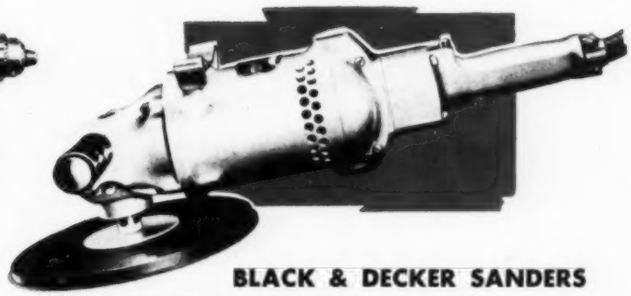
Keep Your Construction Jobs Rolling

with These Black & Decker Tools



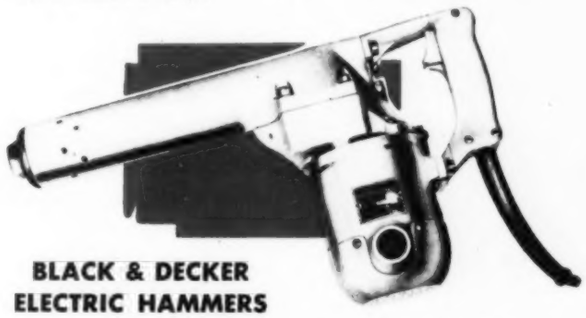
BLACK & DECKER DRILLS

...for faster drilling and boring — For heavy duty drilling of all kinds . . . Black & Decker offers a complete line of Drills for driving Hole Saws, boring through heavy timbers and planking, drilling in hard alloy metals, doing precision work in bench drill stand, etc. Ball bearing construction throughout, wide range of sizes from ¼" to 1¼" for every drilling job.



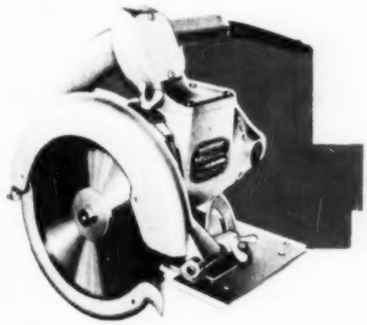
BLACK & DECKER SANDERS

...for all kinds of "finishing" jobs — For faster "finishing" of metal and wood surfaces, with sanding discs; for rust, paint and varnish removal, with wire brushes; for stone and tile surfacing, with grinding wheels; for shaping or surfacing heavy timbers, etc. There are 3 models of Black & Decker Electric Sanders for every type of finishing job. All equipped with spindle lock for quick and easy change of pads, abrasive discs, saucer wheels, planer heads, etc. Switch, commutator and bearings are dust-and-dirt-sealed.



BLACK & DECKER ELECTRIC HAMMERS

...for high speed tamping, gouging, drilling, caulking — "Machine Guns of Industry"... Black & Decker Electric Hammers speed up any cutting or drilling operation that requires hammer action. For channeling or drilling holes in concrete, stone or brick, breaking paving, tamping molds and concrete forms, installing signs or fixtures, gouging or shaping wood beams. Four brute models — more than 15 kinds of Hammer tools to do all sorts of construction jobs *faster* . . . with less effort.



BLACK & DECKER QUICK-SAWS

...for sawing 10 times faster than by hand — Powerful, flexible, Black & Decker Quick-Saws blaze through wood, composition materials and metals. Equipped with abrasive discs, they cut through stone, ceramics and hard ferrous metals faster and easier than ever possible by hand. Three models for every sawing job; will use planer, miter, friction and nail-cutting blades.

Why Contractors Prefer Black & Decker Tools

Black & Decker Tools can be bought *on the job* from conveniently located distributors. Black & Decker Tools do *more work faster,* require less manpower to do jobs. They're easy to use . . . easy for new men to "learn on" . . . "get the feel of." Black & Decker makes a *powered-right* tool for every job . . . *right* size, *right* capacity. And, there's always a Black & Decker Factory Branch close at hand, ready to provide quick, expert service.

For information, phone your Black & Decker Distributor. The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.

THROW YOUR SCRAP INTO THE SCRAP!

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PORTABLE ELECTRIC TOOLS

THE *First Rule*
IN EVERY MANUAL

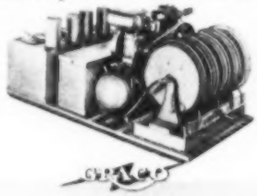
GRACO CONVOY LUBERS

(Portable Power Lubrication Units)

FOR FAST — COMPLETE FIELD SERVICING

The necessity of regular lubrication is recognized by manufacturers of construction equipment. They know that any piece of equipment must be taken care of at regular periodic intervals — to make it keep performing as it was designed to do. That is why most manufacturers consider LUBRICATION of primary importance, and place it first in their maintenance manuals.

Graco Convoy Lubers are designed to pressure lubricate your machinery with maximum speed and utmost thoroughness. Lubrication equipment used in the field must be built to withstand the rigors of hard construction work like any good piece of construction equipment. Graco Convoy Lubers are working in numbers on many of the nation's largest construction projects — like the Alcan Highway — as well as helping the Armed Forces keep tanks, trucks, halftracks and jeeps rolling. Convoy Lubers are preferred by maintenance men for their speed of operation, flexibility, and ability to "take it" under all conditions.



Try lubricating your equipment "on the job" with a Convoy Luber and see how pressure lubrication brings greater results in lower maintenance costs. Write for folder No. 130.

GRAY COMPANY, INC.

MINNEAPOLIS, MINNESOTA

Road Builders Launch *Post-War Plan* At Chicago Convention

ROADS ARE A MAJOR KEY to American victory and post-war prosperity, in the opinion of highway authorities who addressed the annual meeting and post-war conference of the American Road Builders' Association in Chicago, May 4-7.

Major General Philip B. Fleming, administrator, Federal Works Agency, told delegates that plans should be made now for an overall national program of public works to stimulate employment in the post-war period. "Otherwise we are likely to go through the same old wasteful cycle of doles, made-work and relief projects," he explained. "I think the time for merely speculative post-war planning has passed. The time for designing is here. Our primary present task is to attend to the preliminaries — the legal and financial phases of public construction, the acquisition of sites and the advance engineering — so employment will be immediately available when the war ends."

Backlog of Highway Projects

Utah Congressman J. W. Robinson, chairman, House Roads Committee, advocated a backlog of highway projects that will total $3,000,000,000 a year for at least 5 yr. after the war as the best guarantee of post-war prosperity. "Even before the war forced a virtual moratorium on all non-military construction, the nation's highway system was in grave need of improvement. A large portion of the main highways are literally horse-and-buggy roads. The only problem is that of getting these projects under way. The magnitude of this task is so great that it can only succeed through the participation of all road-building agencies. Every state, county and city must have a planned program of highway construction. Reserve funds should be accumulated now to finance post-war projects or to participate with the federal government on a matching or loan-and-grant basis.

The importance of maintaining the system of free enterprise in the post-war era was discussed by Arkansas

(Continued on page 88)

THIS HANDBOOK

will help you prolong the life and maintain the performance of your Lorain. It contains all the facts covering operation, care, adjustment and lubrication . . . condensed in one compact easy-to-read volume.

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Shovels Still Give You
60% MORE BACKBONE

Extra thickness in the center, from tip to top, plus tapered sides, provides the strength and stiffness of a 13 gauge shovel with only 15 gauge over-all weight.

PREFERRED BY PRIORITY BUYERS for Perfect Balance, Deep Hang, Long Life, Easy Handle Replacement.

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Stone, Ballast and Industrial Forks, Asphalt and Road Rakes—Distributors Everywhere.

SEND FOR FREE COPIES: "How to Get More Work Out of a Shovel"—trains green hands, increases output without extra effort. Suitable for posting up on the job. Write us.

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"The letter "S" stamped on the back of this wheelbarrow tells me it's a STERLING wheelbarrow. That's my assurance of getting a really high-grade barrow, the kind that can take the punishment of hard everyday wheeling, and come back for more. No wonder buyers have stuck to Sterlings for nearly 40 years."

Buy BONDS for VICTORY

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

(Continued from page 86)

Senator John L. McClellan. He declared, "The need for more and better highways and what we term farm-to-market roads is recognized as vital and essential to the continuing progress and growth of our nation. Facilities for aiding and expanding transportation must be provided as a part of reconstruction. We should bear in mind that a road-building program, if carried out under the contract system, will in no way detract from or hinder private enterprise, but instead will greatly support and stimulate it. It has been fully demonstrated that the contract system is by far the most practical and economical."

Role of Pan-American Highway

Another member of the Senate Committee on Post Offices and Post Roads, Senator Dennis Chavez of New Mexico, emphasized the role of the Pan-American Highway, particularly from the standpoint of hemispheric unity and good will. He pointed out that, if this route were now complete, "we could make faces at the submarine menace, so far as inter-American transport is concerned." The Pan-American Highway was also discussed by Carlos Bazan, director general of highways of Mexico. He described the present Mexican road program and declared that highway links with the United States have great significance in the friendship and cooperation between the two nations in peace and war.

Superspeed Highways

Visions of a nation interlaced with superspeed highways were drawn by West Virginia Congressman Jennings Randolph at the President's Dinner, entertainment highlight of the conclave. He predicted a giant post-war highway, airport and flight-strip program. Describing a bill now pending in Congress to provide for six superhighways, he said they would be links in transcontinental routes from New England to Florida, Florida to California and San Francisco to New England.

War Construction Program

The war construction program from the standpoint of the Navy and the Army was presented by Capt. L. N. Moeller, director, Progress Control and Statistical Department, Bureau of Yards and Docks, and Lt. Col. Enoch R. Needles, chief, Construction Control Office, Corps of Engineers. Capt. Moeller said that navy contract awards in 1942 totaled $2,700,000,000 and $315,000,000 in the first three months of 1943. Col. Needles said the army spent $5,417,000,000 in completed construction in

(Continued on page 90)

REDUCE WEAR AND REMOVE CARBON WITH MACMILLAN RING-FREE MOTOR OIL

Undue motor wear, waste of fuel and excessive carbon have no place in a sound preventive maintenance program. At the same time, "production" must be speeded up. That's why operators simply must pay more than usual attention to motor lubrication . . . and motor *cleanliness.*

Macmillan RING-FREE Motor Oil cuts down waste and wear while speeding up performance, and at the same time, RING-FREE removes carbon!

In 1094 Certified Road Tests, with various makes of owner-driven cars, 10 per cent increases in gasoline mileage were not uncommon after crankcases were drained and refilled with RING-FREE. As indicated by these tests, the average immediate saving was 1.3 miles per gallon! These tests emphasize that RING-FREE lubricates better . . . *reduces friction faster.* It delivers direct to the drive shaft more of the horsepower ordinarily wasted in overcoming motor friction. It postpones "down-time" for repairs.

Macmillan RING-FREE Motor Oil combines all these qualities: great film strength, high heat resistance, long cling to metal, fast penetration . . . *plus* the fact that it is non-corrosive, is less affected by dilution and it *removes carbon.*

CARBON REMOVAL A NATURAL RING-FREE FUNCTION

Macmillan RING-FREE Motor Oil actually removes carbon while the motor runs! Hence, by its continued use, pistons, rings, valves—all vital parts—stay cleaner. Carbon removal is a natural function of RING-FREE, inherent in the crude oil and retained by the exclusive Macmillan patented refining process, *without the use of additives.*

TO SUM UP: MACMILLAN RING-FREE gives more horsepower to the drive shaft—tangible saving of fuel—allows less wear on hard-to-replace engine parts—it removes carbon.

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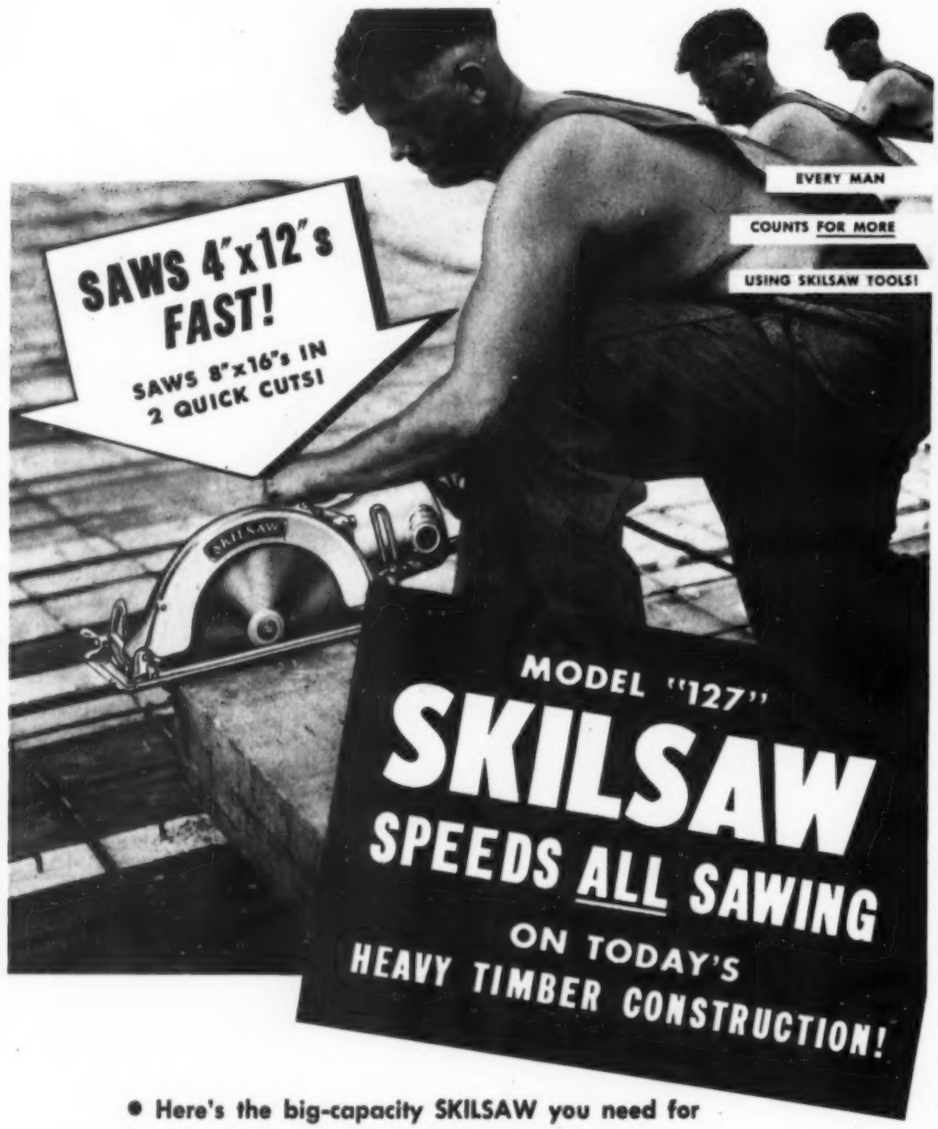
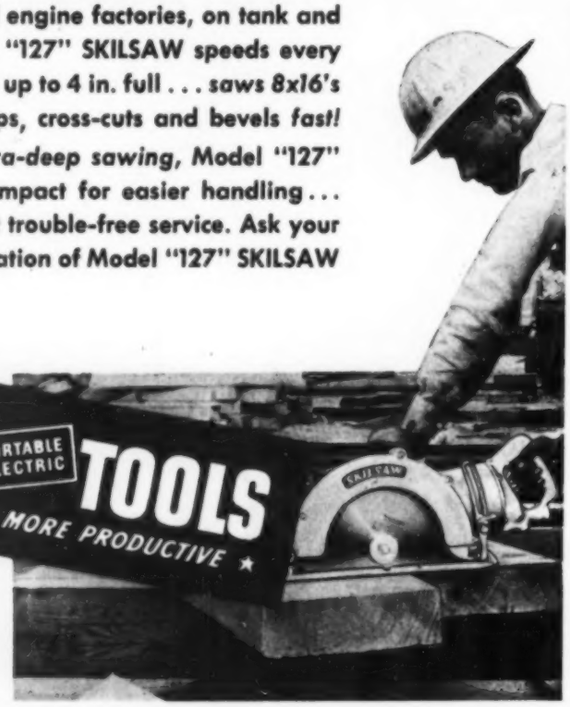
MACMILLAN RING-FREE MOTOR OIL

REDUCES WEAR BY REDUCING FRICTION



• Here's the big-capacity SKILSAW you need for speed where heavy timbers replace steel in war construction! On aircraft and engine factories, on tank and armament plants, Model "127" SKILSAW speeds every cut that's called for! Saws up to 4 in. full . . . saws 8x16's in two quick cuts . . . rips, cross-cuts and bevels fast!

Extra-powered for extra-deep sawing, Model "127" SKILSAW is light and compact for easier handling . . . ruggedly built for longest trouble-free service. Ask your distributor for a demonstration of Model "127" SKILSAW today!



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★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

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Portland • Seattle • Toronto, Canada

(Continued from page 89)

1942. They addressed the Contractors' Dinner, at which was presented for the first time a new film showing the Seabees in action in the Pacific. Capt. Moeller pointed out that many former road builders are now members of the Seabees, nickname of the Navy's Construction Battalions. The vital role of the contract system in the post-war program was explained by ARBA Engineer-Director Charles M. Upham.

Rural Roads

Rural roads in the post-war program were discussed by Nebraska Congressman Karl Stefan. He explained the close relationship between farm-to-market road conditions and the prosperity of the farmer, as well as the well being of everyone with whom he does business. Speaking at a County Division meeting, Wiley M. Riedel, president, National Rural Letter Carriers Association, quoted letters from his members pointing out the increased cost of mail delivery as a result of road deficiencies.

Post-War Forum

Col. Willard T. Chevalier, publisher, *Business Week*, addressed the luncheon-meeting of the Post-War Highway Program Committee. He told delegates that post-war planning should not be based on the expectation of a depression after the war but upon the serious need for highway improvement. Col. Chevalier also acted as moderator for a Post-War Forum. On the panel were Congressmen Jesse P. Wolcott of Michigan and James W. Mott of Oregon, Ohio Highway Director Hal G. Sours, Tracy Harron, past-president, Associated Equipment Distributors; Manufacturers' Division President E. R. Galvin; Contractors' Division President James J. Skelly; Municipal Division President Raleigh W. Gamble; and Manton Hannah, McLennan county engineer, Waco, Tex., who represented the County Highway Officials' Division as its immediate past-president.

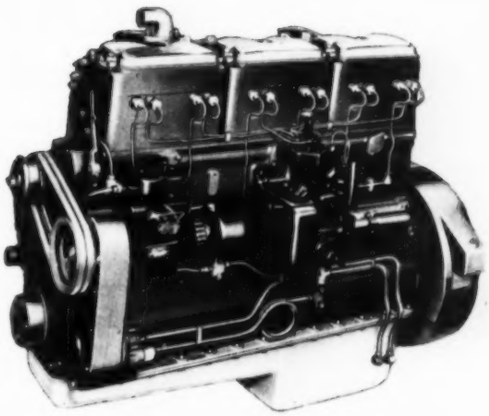
New Division Presidents

Relief of unemployment through post-war road construction was stressed by Missouri Chief Engineer Carl W. Brown, newly elected ARBA president. New division presidents installed at this meeting were: James J. Skelly, president, Associated Pennsylvania Constructors, Media, Pa., (Contractors); R. B. Traver, Onondaga county superintendent of highways, Syracuse, N. Y., (County); and E. R. Galvin, general sales mana-

(Continued on page 92)

Where *PERFORMANCE* Speaks Louder Than Words

Blazing new highway trails and building air bases . . . yarding and hauling logs to provide lumber for weather-tight barracks . . . generating power 24 hours a day for the man with the tools behind the man with the gun . . . toting back-breaking loads over truck-killing grades . . . bringing in new wells to slake the thirst of jeeps and P-38's . . . pulling a winter's coal supply or 10 yards of ore over the upper lip of strip mine or iron pit . . . docking record catches of food-fish for a ration-conscious nation. All of these are the "vital-to-victory" jobs on which Cummins Dependable Diesels—many with a million miles or 30,000 hours of service already to their credit—are setting new performance records in all parts of the country . . . records that speak—louder than any words—for the Cummins Diesel's proven dependability.



CUMMINS ENGINE COMPANY • • • COLUMBUS, INDIANA

PRODUCTION RECORD BREAKER

It's the PAGE TWO-ENGINE Diesel Powered Walking Dragline

Nothing slow about this machine! At last here's a steady, smooth flow of power straight through the digging cycle. One Page Horizontal Diesel Engine puts zip into the Hoist . . . the other is free to speed up the Swing, keeping pace with the faster Hoist. No wonder these Page TWO-ENGINE Diesel-Powered Draglines are Production Record-Breakers. FASTER HOIST and FASTER SWING mean MORE YARDAGE MOVED PER SHIFT . . . jobs completed AHEAD OF SCHEDULE . . . America made STRONGER!

Write for illustrated catalog showing Page TWO-ENGINE DRAGLINES—on the job.

PAGE • *Two-Engine* • **DRAGLINES**

GETS THE "LAG" OUT

PAGE ENGINEERING COMPANY • CHICAGO, ILLINOIS

(Continued from page 90)

ger, R. G. LeTourneau, Inc., Peoria, Ill., (Manufacturers).

Re-Conversion To Peace

W. P. Witherow, president, Blaw-Knox Co., took up the problem of reconversion to peace from the manufacturers' point of view. City planning and financing were analyzed by Robert Moses, member, New York City Planning Commission, and Major I. V. A. Huie, New York City commissioner of public works. Road construction in urban areas was also featured by Frank Herring, assistant director, National Resources Planning Board. H. O. Penn, AED vice-president and president, Penn Machinery Co., presented the viewpoint of the equipment distributor.

★ ★ ★

Six-Point Program for *Electrode Conservation*

IF VITAL WAR PRODUCTION is not to be impeded by lack of arc-welding electrodes, utmost cooperation of electrode manufacturers and users to make the most of the electrode being produced is essential. So said H. O. Westendarp, welding engineer of the General Electric Company, in a recent talk before the Cleveland Section of the American Welding Society.

Mr. Westendarp pointed out that electrode manufacturers are operating around the clock, 7 days a week In addition, bare portions of electrodes have been reduced to a minimum in order to lower stub losses, and development laboratories have improved coatings to bring about reduced spatter loss.

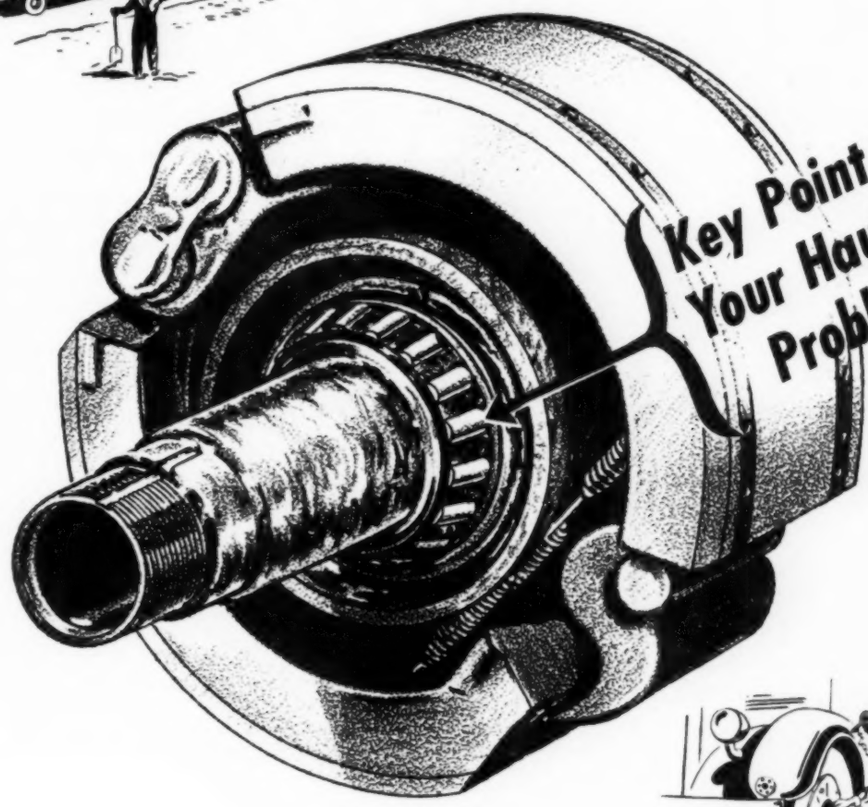
Conservation up to Users

The big job of getting the most out of available electrode, however, he declared, was up to users of arc welding. In this connection, he suggested the following six-point program as a guide:

(1) Select largest diameter and greatest length electrode that can be applied successfully. This not only speeds up deposition rates of weld metal, but also results in a decided increase in the tonnage of electrode

(Continued on page 94)

KEEP THEM MOVING! In these war-rushed days when equipment is operating at capacity it is important to use the finest wheel bearing grease—avoid costly delays and repairs.



Key Point in Your Hauling Problem

LESS SHOP TIME is eaten up by wheel bearing repack jobs — and equipment spends more time on the job — if the finest all-season grease is used. See below.

MOBILUBE "V" helps reduce wheel bearing repacks!

This smooth, short fiber, soda soap grease meets U.S. Army specifications. It stands up—provides remarkably efficient and long-lasting lubrication. It's a "year around" grease—*does not require changing because of weather.*

Although designed primarily for wheel bearings and grease-type universal joints, it is also recommended for clutch release bearings and other parts operating at high temperatures lubricated through fittings or grease cups.

There is a Socony-Vacuum grease—the right type and grade—for every part of every vehicle you use. Properly applied, they minimize maintenance and repair expense—help keep machines in A1 condition.

SOCONY-VACUUM OIL CO., INC. and Affiliates: Magnolia Petroleum Co., General Petroleum Corporation of Calif.

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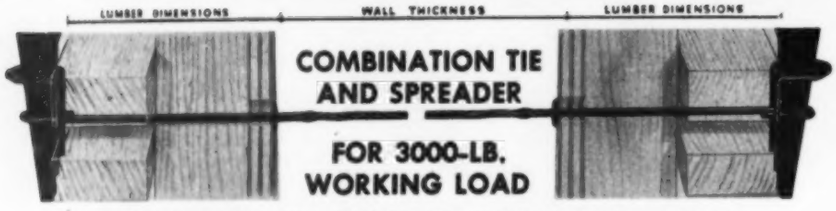
SOCONY-VACUUM

SOCONY-VACUUM FUELS, LUBRICANTS AND ENGINEERING SERVICE

Save TIME AND MONEY ...on light wall construction with TWISTYES

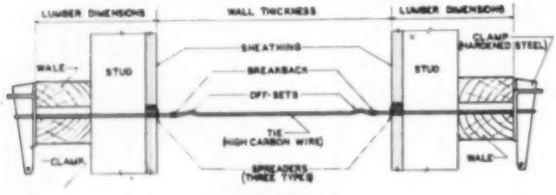
PATENTED



WITH THESE IMPORTANT FEATURES

THE TIES • Easy to insert in wall forms • Can be twisted off back of the wall face • Strong spreaders, assuring accurate wall widths • Accommodate any size form lumber or wall width • Leave small hole to be grouted • Removable without stripping forms—leaving no projecting wires to interfere with stripping or injure workmen.

THE CLAMPS • One piece combination wedge and bearing plate • Easy to apply and to remove • Will not turn, cannot fall off • Ample take-up to overcome irregularity in lumber sizes • Large bearing area—will not "bite" the wale under maximum load • Hardened wedge, high-grade steel bearing plate—indestructible: assuring extremely long life, no maintenance cost, real economy.



The features of Universal TWISTYES detailed above warrant full consideration for construction of ordinary, finished and water-tight walls. You will find it profitable to get complete information on TWISTYES.

Write Today for Catalog

Universal FORM CLAMP CO.

1240 N. KOSTNER AVE., CHICAGO

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

(Continued from page 92)

that can be extruded per day from existing facilities.

(2) Joints to be welded must have good fit-up—excessive gaps are prolific wasters of metal.

(3) Use proper amperage for the job—avoid excessive currents and long arcs. There is a current beyond which deposition rate is decreased and electrode consumption increased.

(4) Don't bend electrodes except where absolutely necessary. Bent electrodes destroy electrode coating and result in excessive stub losses.

(5) Produce true fillet welds having equal legs—this is a function of proper type of electrode and welding technique.

(6) Use each electrode down to point where full coating diameter ends.

"Another point that should be kept in mind," Mr. Westendarp stated, "is that electrode inventories should be utilized and stub ends converted as rapidly as possible. Keep electrode off the floor—keep it moving."

"Universal adherence to such a program as outlined would mean that upwards of 20 percent more electrode could be saved, thus helping considerably in taking up the slack between electrode production and consumption."

Availability of Equipment

In connection with the availability of arc-welding equipment itself, Mr. Westendarp pointed out that ac. equipment could be obtained more readily than the dc. type. He explained that the manufacture of ac. equipment requires less tooling and machine work and conserves critical materials such as copper and steel.

In closing, Mr. Westendarp paid tribute to the patriotism and cooperation of welding operators in conserving electrode. "A good job is being done," he said, "but still more must be done—every pound of electrode produced must be put to work efficiently. Only through such measures will we have enough electrode to meet our war needs."

★ ★ ★

FOR RECORDING REPAIR AND MAINTENANCE COSTS on rock-drilling operations Ingersoll-Rand Co. offers free of charge a supply of printed sheets which make it possible to show accurately the upkeep cost of every drill in service and also to keep such pertinent data as drill number, class, model, manufacturer, names and numbers of new parts installed, cost of installing parts and number of shifts drill works. Size of sheets is 8½x11 in., is designed to fit in any standard file and is punched for use in standard 3-ring binders. Sheets will be forwarded to drill operators and owners upon request.—**Ingersoll-Rand Co., 11 Broadway, New York City.**

Hints for BIGGER CRANE OUTPUT

BUCYRUS ERIE

Here are a few simple hints that may help you increase your crane output:

1. Be sure footing is good. A little extra time spent preparing good footing will be more than repaid by increased speed, steadiness and safety of operation. Remember not to let the side of the machine toward the load be low.
2. Do not exceed stability ratings; do not operate with boom angle greater than 78° to horizontal.
3. Accurate control means speed. Keep brakes and clutches in proper adjustment.
4. Use sufficient parts of line to insure needed accuracy of control, combined with minimum stress on the machine.
5. Do not propel machine while boom is at high angle.
6. If you have to move with a load in soft going, the cats will "climb" better if you move with the load behind. Don't travel with close-to-maximum loads.
7. If you move with a load, it should be snubbed to the machine to prevent it from swaying.
8. Set up a regular schedule for inspection and lubrication.

ARMY E NAVY

Bucyrus-Erie employees have accepted the award of the Army-Navy "E" as a challenge to keep production rising. * *

Bucyrus-Erie

SOUTH MILWAUKEE • WISCONSIN • U. S. A.

Carver Model 3651 (15,000 GPH) dewatering an excavation in Florida.

JOB records show that Carver Certified Pumps stymie the wear and tear of Time . . . keep their original lightning-fast prime, their original high efficiency even after hundreds of *extra* hours of service. On the really tough jobs where the water's full of mud or abrasive sand or grit, these rugged Carvers make an even better showing, for they're designed and built to handle the toughest jobs with easy-job economy.

Before you buy a pump, check the facts on Carver performance . . . you'll be hours and dollars ahead! See your dealer, or write us direct for complete information on Carver gas engine, electric motor or belt driven pumps from 3,000 to 125,000 GPH.

THE CARVER PUMP CO.,
MUSCATINE, IOWA

Safe Practice in *Wrecking and Demolition*

By OTTO H. HOMSKOG
Senior Construction Engineer, Employers Mutuals, Milwaukee, Wis.

(From a paper presented before the Construction Section, National Safety Congress, Chicago.)

WRECKING A STRUCTURE whether large or small calls for experience and skill. The management must be well acquainted with all the problems. They must have the proper personnel and equipment, and let me tell you, good foremen with a will to stick to it and the ability to plan and foresee what might happen are more important on jobs like these than the most modern equipment.

In order to wreck a structure rapidly and safely, a careful study of it and its surroundings must first be made. Then a definite plan of procedure should be worked out and followed as closely as possible. The security of adjoining structures must be considered in the planning and adequate protection for such structures must be provided.

Warning signs and red lights should be placed wherever the public may be exposed to danger. Structures should be barricaded so that children and the public as a whole can be kept away from hazardous areas.

Demolition Must be Systematic

Demolition should always proceed systematically story by story and all work on the upper floor should be completed before any of the supporting members or other important parts on lower floors are removed or disturbed. All gas, electric and water-mains should be shut off before any other work is started. Windows and glass doors should also be removed before proceeding with other work. Then all lath and plaster should be stripped throughout. This method reduces the glass breakage and dust hazard before the actual wrecking starts.

Stripping Operation Important

Another reason why it is important to strip the walls and ceilings of lath and plaster before wrecking starts is that when the skeleton of a structure is bared, the foremen can determine

(Continued on page 98)

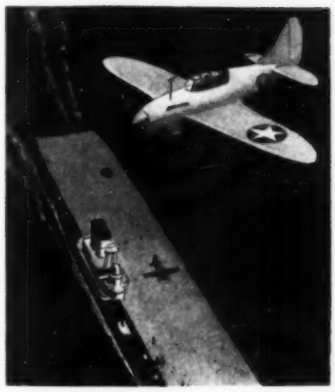
WIRE ROPE FIGHTS AT SEA

TRAPPING U-BOATS

When a Nazi U-boat sneaked into Scapa Flow and blasted Britain's big carrier *Royal Oak* to the bottom, the loss underlined the fact that to block U-boats out of a harbor, you've got to lock it up tight—not just with mines but with elaborate nets made of strand. Keeping harbors closed to undersea marauders is one of Bethlehem's war-time jobs. Our wire-rope mill has been turning out large quantities of harbor-defense strand—a high-strength strand of special construction, and with the famous bethanized electrolytic zinc coating.

TOSSING FIGHTERS INTO ACTION

An aircraft carrier, as everybody knows, houses its fighter planes and bombers on the hangar deck, which is directly beneath the flight deck. When an attack alarm comes in, those planes must get from hangar deck to flight deck and into the air in almost less time than it takes to tell about it. Special Bethlehem wire rope is used in the high-speed plane lifts of some of America's biggest carriers.



TOWING DAMAGED FREIGHTERS

Every cargo vessel in a convoy is now equipped with two husky towing hawsers, installed in such a way that they can be rushed into action at a moment's notice. If a vessel is struck and crippled by a torpedo, one of the emergency towing hawsers is attached to a sister ship and the damaged vessel is brought safely into port. Bethlehem has had a lot of peacetime experience in building strong, corrosion-resistant towing hawsers. United Nations' convoys are benefitting from that experience now.

★ ★ ★

In hundreds of jobs on sea and on land—ships' rigging, aircraft-control cord, minesweeping cable, mine-anchor cable, and naval dredge rope, to name a few—Bethlehem Wire Rope is helping to win the war. There are also pressing needs for Bethlehem Wire Rope on the home front—in war factories, mines, timber lands, construction jobs, and oil fields. We are doing our level best to keep everybody adequately supplied. The job is enormous. If you have to wait to get delivery on your rope, we hope you'll keep that in mind, and bear with us.

Bethlehem Manufactures Wire Rope for all Purposes

(Continued from page 96)

whether they can proceed as planned. Material should never be thrown to the ground. It should be lowered either by means of ropes or suitable tackle. Bridges should be watched carefully to prevent overloading. Wooden or metal chutes should be used for the removal of bricks and other loose material. These chutes should be tight and well constructed and extend in a broken line from floor to floor. A gate should be placed at the bottom. A danger sign should be placed at the discharge cautioning workmen and truck drivers to stay away from the discharge of chute. Flashboards, extra high, should be used on the trucks to prevent material from bouncing off the trucks.

Removal of Walls and Chimneys

Sections of walls should never be loosened and allowed to be pulled over upon the floors of the structure being wrecked. Walls should be removed part by part. If walls are too thin or too weak for a man to stand on, staging should be built up for the men to work from.

Chimneys and walls should, as a general rule, never be pulled over.

Safety Measures

Openings in floors should either be covered or guard-rails and toe boards placed around the openings. Stairs and stair-railings should be left in place as long as possible. Do not allow material to accumulate on a floor so as to overload it. Do not overload hoists or elevators. Scaffolds used on walls should be self-supporting, especially in burned buildings. Special care should be taken when beams are removed from party walls. A wrecking contractor should always have on hand hard hats, iron workers safety belts, chipping and burning goggles, dust masks. In addition, the men should be required to wear heavy-soled safety shoes and heavy leather gloves.

Mistakes are the cause of most of our accidents. I mentioned before the importance of having foremen with a will to stick to it and the ability to plan and to foresee what might happen. Fortunately, we have such foremen now. They have gone through many years of training during a long construction program and those men are the backbone of our safety program. Through these men the errors and mistakes are going to be reduced to a minimum, thus lessening the causes of accidents.

If we can apply the psychology of safety correctly, more than 90 percent of our problems will be conquered. The other less than 10 percent is easily covered by our construction experience.

An effective idea is the use of the safety flag. Suppose we have a large wrecking job. It has been decided to use the safety flag idea. A flagpole is erected near the time shack and a safety meeting of all the men is held around the flagpole. A short safety talk is given and at the end the safety engineer unfolds the safety flag.

As an added feature of this program, the foremen in whose crew a lost-time accident occurs, must lower the flag and raise it again after 24 hr. Both superintendents and foremen hate to see the flag come down and many of them have gone to quite a bit of trouble trying to prove that the men losing time either were not working for them or used a minor injury as an excuse for staying home for a few days.

★ ★ ★

Engineer-Builders Seek Answers to *Four Post-War Construction Problems*

POST-WAR CONSTRUCTION PROBLEMS are claiming the attention of The H. K. Ferguson Co., engineers and builders of Cleveland and New York, which is attempting through the use of industrial research to find the answers to four questions relating to this future period.

"We must maintain constant research to develop new designs, discover new materials and equipment, and improve construction methods in the field," Mr. Ferguson, originator of the standard factory building principle, said.

"All of us must realize that unless we do serve our customers adequately, and to their advantage, some kind of competition or market change will ultimately see others supplanting us," he added.

The four problems which Mr. Ferguson regards as important to the future of the industrial engineering and building business are:

(1) What are our customers likely to want to buy in the way of engineering services, factory buildings, or

(Continued on page 100)

Here Is Your Nearest Worthington Distributor

For Sales, Rentals and Service on BLUE BRUTE Portable Compressors, Rock Drills and Air Tools.

See full page ad page 99.

ALABAMA
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West Lebanon—P. I. Perkins Company
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Spokane—Andrews Equipment Service
WEST VIRGINIA
Fairmont — Interstate Engineers & Constructors
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Eau Claire — Bradford Machinery Company
Green Bay — Nelson Machinery Company
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Get more WORTH from air with WORTHINGTON

Big Blue Brutes

Worthington Pump and Machinery Corp.

A GOOD MAN WITH BRUTES

Buy 'em, rent 'em, get 'em fixed... he's a good man to depend on when you're *in* a jam or want to ***keep out*** of one.

He's the Worthington distributor, the man who handles Blue Brutes — compressors, rock drills, air tools.

If you need a Blue Brute — or several — ***fast*** . . . he'll do his darndest to get it to you as soon as possible after you hang up your phone. If your Blue Brutes are facing a stiff schedule, he's the man to send them to for a "physical" — a wise precaution these days when replacements are hard to get. If rough treatment has turned up bruises or breaks, he's got a "first aid kit" of supply parts and repair "know-how" that will restore their pep and vigor.

They make quite a team. Rugged, easy-breathing Blue Brute Air Compressors with the improved and famous "Feather* Valve" . . . easy-handling Blue Brute Rock Drills and Air Tools for a wide range of work . . . and capable, cooperative Blue Brute Distributors whose job is helping you get *your* job done.

*Reg. U. S. Pat.
‡Blue Brute Compressors and Air Tools are painted olive drab for the Army and battleship gray for the Navy.

Behind the Fighting Fronts with

BLUE BRUTES

Blue Brutes on the Alaskan highway help punch through the vital life line that will help the U. S. Army smash the Japs! In addition, Blue Brutes are at work today on hundreds of Army, Navy and Air Force projects all over the country — in "uniforms" of olive drab and battleship gray, instead of customary blue.‡ Your nearest distributor is listed on page 98.

Get more WORTH *from air with* WORTHINGTON

BUY BLUE BRUTES

Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

WORTHINGTON

Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts

Helping a "Conqueror" prepare ....for oblivion

CITIZEN and warrior, you know that the defenses your unwilling hands are building will not save the self-styled "conquerors" of Greece. Who has ever conquered Greece and held it enslaved? History answers in tones of thunder: "None!"

Soon, that thunder will be real when your allies come to join you with massed planes and tanks and guns to drive the last Nazi barbarian headlong from your soil. Until that day, hold your strongest defense – *the resolve to be free!*

The vast armaments that are on their way have their beginnings in free America – deep in pit, mine and quarry where strong men set even stronger forces at work – using Ensign-Bickford Safety Fuse and Primacord-Bickford Detonating Fuse to make pounds of explosive blast out tons of coal and useful ores!

Yes . . . *Victory begins underground!*

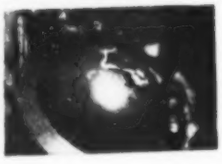
THE ENSIGN-BICKFORD CO.
SIMSBURY CONNECTICUT

Primacord-Bickford
Detonating Fuse

F-F

STRAUSS

PROTECTOR HELMET SAVES WORKER'S LIFE



A worker's life was spared today when a steel clip plummeted 30 feet and struck the helmet he was wearing. The illustration shows the clip and the Strauss helmet that absorbed the force of the blow. The uninjured worker immediately after the near-tragedy hurried to the safety office to secure a new protective chapeau.

Insure the lives of *your* workers by specifying STRAUSS PROTECTOR HELMETS. This vulcanized fibre positively will not deteriorate in rain or heat. In fact, THEY GET TOUGHER WITH AGE. For added protection the crown is reinforced with a second piece of pre-formed fibre. Write for information.

STRAUSS SAFETY BELTS also meet every individual hazard. Ask for complete catalog.

The **STRAUSS** Company
850 EWART BUILDING, LIBERTY AVE., PITTSBURGH, PA.
SAFETY HATS and CAPS • SAFETY BELTS and HARNESS

(Continued from page 98)

new equipment work between now and the end of the war?

(2) Out of the intense pressure of the war effort, what new types of industrial buildings and equipment are likely to be developed, and how will high type industrial buildings be designed and built for post-war use?

(3) What can we and others in our industry do to help keep industrial construction at reasonable levels so that we, and the other men who depend upon us for employment, can hopefully avoid the tragic experiences of several years during the last depression, when the volume of industrial construction was very low indeed?

(4) What can we do, working with labor, to improve our already harmonious mutual relations, and jointly work constantly and constructively to the best interests of our mutual customers?

"Since our particular product is buildings, we naturally are looking forward to new planning for industrial buildings of the future," Mr. Ferguson said, in announcing the research goals. "In carrying out this program, we must dedicate ourselves to the premise that nothing new will be worthwhile unless it is more useful to our customers — and to ourselves."

Mr. Ferguson explained that research in his organization was not participated in only by engineers and draftsmen, but extended into the ranks of the men who did the actual building — to the carpenters, ironworkers and bricklayers who daily are devising new, more effective and more economical construction techniques, and passing them on for the use of the entire organization.

★ ★ ★

Special Ration Stamps for *Safety Shoes*

SPECIAL RATION STAMPS for safety shoes are now available as a result of the unusual drop in the sale of this footwear and a consequent rise in accidents because workers were not purchasing them. Formerly safety shoes had to be acquired with the regular shoe rationing coupon and this led to a decrease in their use and a subsequent loss in man-hours and war production due to foot and toe injuries. Under the new OPA

(Continued on page 102)

Power And Speed For QUICK ACTION

On the War Front

No breakdowns...no letdowns...when *quick action* is needed with Koehring simple controls and smooth operation. Quick accessibility makes it easy for the operator of a Koehring Shovel to keep all parts of his machine well lubricated and clean. And smooth operation enables him to maintain top production for maximum output per shift. Keep your Koehring shovel in a natural smooth running condition for the duration. New equipment is now available only to the armed forces or highly essential military construction projects.

Depend on your Koehring distributor to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

KOEHRING COMPANY • *Milwaukee, Wisconsin*

KOEHRING K HEAVY DUTY

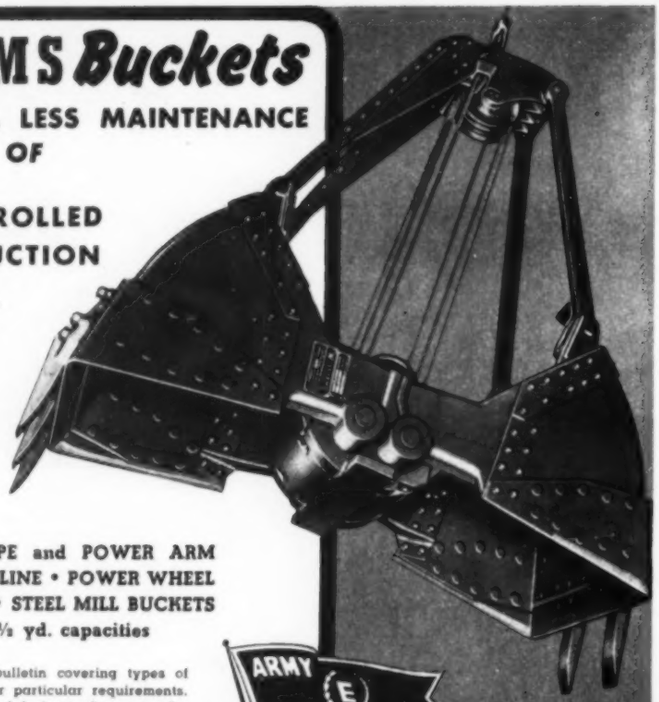
HEAVY-DUTY CONSTRUCTION EQUIPMENT

WILLIAMS Buckets

LONGER WEAR, LESS MAINTENANCE COST *BECAUSE OF*

WELDED ROLLED STEEL CONSTRUCTION

● Williams Welded Design means greater strength and eliminates unprofitable "dead" weight.



MULTIPLE ROPE and POWER ARM TYPES • DRAGLINE • POWER WHEEL • DREDGING • STEEL MILL BUCKETS
⅛ to 16½ yd. capacities

Send for free bulletin covering types of buckets for your particular requirements. It shows details of design and many exclusive features that clearly prove why YOUR NEXT BUCKET SHOULD BE A WILLIAMS.

ARMY (E) NAVY

THE WELLMAN ENGINEERING COMPANY
7017 Central Avenue • Cleveland, Ohio

BUILT BY **WELLMAN**

A Shovel-view of the World at War!

From the "fox holes" of New Guinea or the slit trenches of Tunisia, the panorama of war is grim, with sudden death ever present • Meager as the protection of these bulwarks may seem, they are mighty important to our courageous fighting men . . . and the tools with which to dig them are equally important. • Here is where "Ames" again helps to win . . . just as in the Battle of Bunker Hill and every American War since then. Today specially designed small "Trench Shovels" and sturdy standard sized shovels are the tools for digging "Fox Holes" and Trenches • And wherever U. S. Engineers are building bridges, making roads or repairing airfields on the many battlefronts of this global war, among the tools they use, you'll find "Ames" shovels. • If "Ames" shovels could talk, they'd give you a vivid picture of War — one that would spur everyone on the home front to greater efforts. So, whatever you are doing to help, do a little more — buy more War Bonds.

"AMES" BRANDS KNOWN AROUND THE WORLD

O. AMES ★ OPTIMUS ★ KNOXALL ★ RED EDGE ★
COLT ★ PONY ★ HUSKY ★ RAM ★ CARTER ★ BRONCO ★
PEERLESS ★ FAVORITE ★ PINNACLE ★ MONONGAH ★
TWO STAR ★ THREE STAR ★

AMES Since 1774

PARKERSBURG, W. VA. ★ **AMES BALDWIN WYOMING CO.** ★ NORTH EASTON, MASS.

(Continued from page 100)

regulations industry is permitted to take applications for safety shoes from its employees and to issue special safety shoe ration stamps in the plant. These new rationing regulations are summarized briefly in a pamphlet entitled, "New OPA Regulations Governing the Distribution of Safety Shoes by Industry," which may be obtained free upon request, together with employees' application form, from the Lehigh Safety Shoe Co., Inc., Allentown, Pa.

★ ★ ★

How to Avoid *Accidents* In Mixing and Placing *Concrete*

By LESTER C. HAMMOND
Chief Engineer
Office of Commissioner
of Borough Works
New York City

(Paper presented before Construction Section of National Safety Congress, Chicago.)

PROBLEMS CONNECTED with the construction of substructure foundations and superstructures with concrete are so numerous and often so complicated that time cannot be taken to go into this subject in detail but simply to discuss general and safe methods for the handling and construction of forms and concrete work. The first step should be taken by the management in organizing a safety program to assure the safety of the men on the job. The size and character of the organization and the methods used will vary, of course, acording to the nature of the work and the number of men employed. In every case, however, one or more men should be appointed to make regular inspections of the entire job to discover dangerous conditions and practices, and to see that they are corrected. On every large job there should be a safety committee headed by the superintendent to hold weekly meetings. Every accident should be discussed, the cause determined and the recommendation made for preventing similar

(Continued on page 104)

Mud, dust, or sand . . . hot or cold

Gulf Quality Lubricants provide

greater protection against excessive wear

"All-weather protection with Gulf quality lubricants played a big part in our finishing up months ahead of schedule," says the contractor on this large airport project. "In spite of widely varying operating conditions as the job progressed, our equipment made an outstanding efficiency record and we experienced no failures of lubricated parts."

With spare parts and new units so difficult to obtain, breakdowns of key equipment on the job are a serious matter. So proper lubrication—always a big dividend payer to contractors—is now a vital requirement for keeping up to contract schedule.

Here's how to play safe on your next job: Call in a Gulf Service Engineer and ask him to recommend the best lubrication for your equipment. From Gulf's complete line, he will prescribe oils and greases exactly suited to your requirements—tough and stable oils and greases that stand up and provide better protection against excessive wear under every operating condition. This kind of lubrication will insure more efficient service from every unit, a minimum of operating delays, and lower maintenance costs.

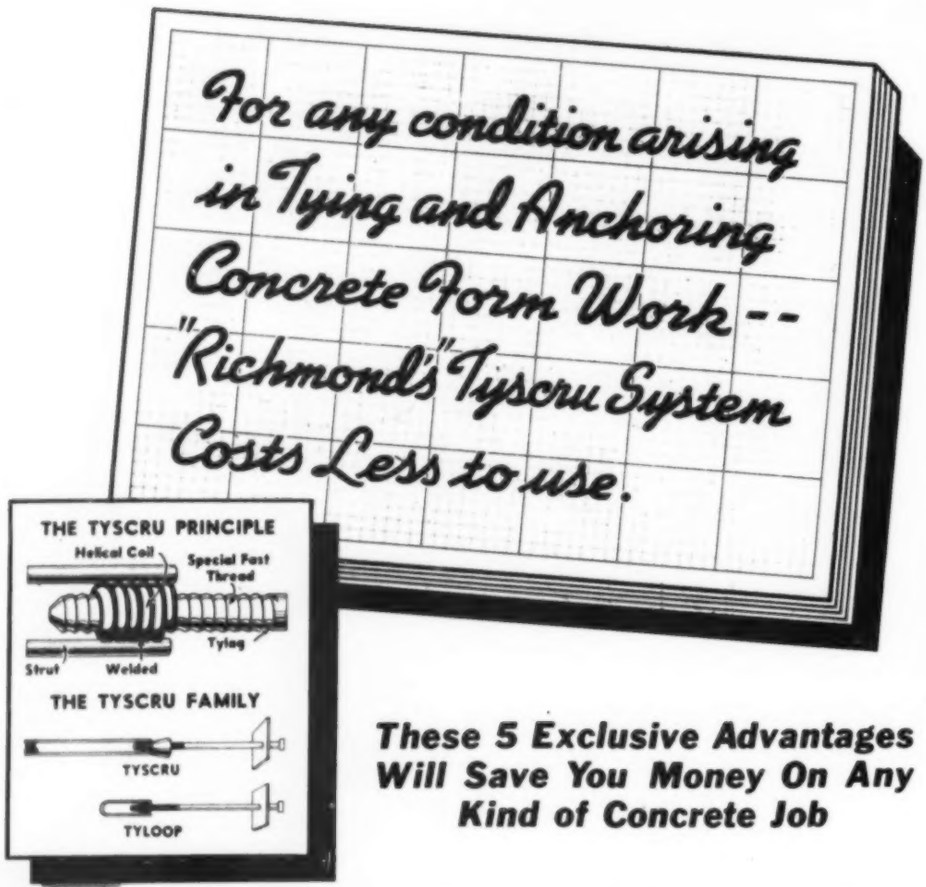
The services of a Gulf Engineer—and the Gulf line of more than 400 quality lubricants—are available to you throughout 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION

GULF REFINING COMPANY, PITTSBURGH, PA.

FORM-TY ENGINEERING FACTS



These 5 Exclusive Advantages Will Save You Money On Any Kind of Concrete Job

(1) You save up to ⅔ the steel required for ordinary field assembled form-tying methods; such as Rods and Clamps or "she" bolts. (2) You lessen the cost of form work with Tyscrus because form work is planned for greatest economy. (3) The Tyscru System saves time and advances job progress; it exactly fits job conditions. (4) They may be easily and quickly used for reanchorage of lift forms, due to coarse threads. (5) Working parts are returnable for credit. No rentals charged.

SEE OUR CATALOG IN SWEET'S

And, in addition, our Job Planning Bureau will gladly save you and your men hours of time and many dollars in materials by providing job working drawings without extra cost. May we discuss your next job with you?

(It May Pay You To Tear Out This Ad And Save It)

RICHMOND SCREW ANCHOR COMPANY, INC.

816 LIBERTY AVENUE • BROOKLYN, NEW YORK

(Continued from page 102)

accidents and for improving conditions in general.

In the final analysis the success of any effort to secure safety depends upon the attitude of the men at the head of the organization. They dominate the policies of the firm in the matter of safety to the same degree that they dominate the policies of the firm in the matter of production and in the character of the work performed. If they emphatically insist on safety, the organization will reflect their attitude.

Machinery Safeguards

In the actual construction itself, severe exposure exists with regard to the mixing machinery. All pulleys, belts, gears and openings on these machines should be fully guarded. One man who operates the machine should be in full charge of all equipment at all times and should allow no unnecessary laborers on the platform of the machine at any time while it is in motion. The man who operates the trip gate used for filling the concrete buggy or hoppers should wear goggles to prevent any flying particles of cement from lodging in his eyes and causing burns. The various types of machines used to mix the concrete present individual problems in safety which must be met by the superintendent with logic and firm determination.

Selection and Care of Form Lumber

The forms required on the same type of work will vary considerably according to the kind of material available for use in the forms and the rapidity with which the concrete is deposited. The water ratio (slump) and even weather conditions will affect the strength required in the forms. Concrete sets much more slowly in cold than in warm weather. Therefore the fluid pressure of the concrete continues against the form for a longer period, and as the pouring progresses the fluid pressure built up in the cold concrete increases in direct ratio to weight and depth of the concrete. If the rate of pour is so rapid that initial set will not occur during pouring operations, the pressure at any point in the form will be equivalent to the full hydrostatic head. All lumber for forms, should be free from knots, shakes, decay and any other imperfection affecting the finished surface of the concrete and the strength of the structural members of the form work. This is of particular importance when erecting forms for arches with long spans or when erecting forms at a location

(Continued on page 106)

Old friend arrives . . . Thanks to you

When you're halfway around the world, trying to finish an important job, it's mighty pleasant to greet an old and very helpful friend you used to work with.

Back home, in scores of industries, the men now on palm-fringed shores learned an affectionate respect for the dependability of Wickwire Rope. Now when stout wire rope is more than ever a matter of life and death, the sight of a reel of *Wickwire* Rope brings double cheers.

These buddies of ours know that *you* need Wickwire Rope, too—to help in your speeded-up *production* of lots of things for them. So they're grateful when you make each length you now have last longer, so that more Wickwire Rope can be used to equip the Liberty Ships, and to send overseas.

But when you do need more of this friendly Wickwire Rope to help maintain your war-production pace, won't you please order it *without* reels, if lengths will permit, so that handier reels can be spared for the boys out there? Wickwire Spencer Steel Company, 500 Fifth Avenue, New York.

• • •

Wickwire Spencer was the first manufacturer in all New England to be awarded the Maritime M and Victory Fleet Flag for outstanding production accomplishments!

DO YOUR MEN KNOW HOW?

Our free book "Know Your Ropes" pictures the best ways to splice, attach sockets, etc. Also shows the right and wrong ways to use wire rope. In the hands of new men (and even old-timers) it can help you make your present wire rope last longer. Send for a free copy.

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

WICKWIRE PRODUCTS

G.H.Q. for Safer Hook Design

Laughlin offers you the most complete line of hoist hooks on the market, in the most varied and fool-proof choice of safety designs — all drop-forged from selected steel and heat treated. Look for the ⓐ, the sign of strength and safety.

Safety Eye Hook | Safety Shank Hook | Safety Swivel Hook

The Safety Hook That's Really Safe

A safety latch (as illustrated) is available on all sizes and styles of Laughlin Hoist Hooks. The properly designed, stout-springed safety feature securely traps the sling — no hazard of accidental slipping or jolting off.

THE STRONGEST OF ALL DESIGNS LAUGHLIN'S CARGO HOOK

Well known to shipping men, this hook is designed for a straight pull. It is as strong as a standard hook twice its weight.

The protective tooth prevents hook catching and tipping the load. Hooked lip gives added security.

Available for 2, 4 and 10 ton loads.

Laughlin's Latest Catalog Shows the Complete Line of Laughlin Wire Rope Fittings. Send for it.

Sold Through Oil Field Supply House

Look for Laughlin Products in Thomas' Register

THE THOMAS LAUGHLIN Company PORTLAND, MAINE

(Continued from page 104)

where any vibration is encountered. If concrete is to be poured into the forms by means of a bucket suspended from a crane or derrick, the form should be protected against damage from the bucket striking against it. The top wale should be located so as to serve as a kick plate to take the impact of the bucket. It is also necessary to provide extra bracing to prevent disalignment and dislodging of the form.

Stripping Forms

In removing or stripping forms, particular care should be exercised to prevent injury. Particular attention should be paid to the removal of nails from the forms to reduce the possibility of cuts, punctures and attendant infections. Forms should be removed to a pre-selected location and properly piled to be ready for reuse and also as a good housekeeping measure. Men should not work over a place where forms are being removed from a structure or under a place where forms are being removed. If this becomes necessary, protection should be provided to eliminate the strippers from being injured from any object falling from above, or a decking should be provided so that workers below will not in any way be injured by the strippers.

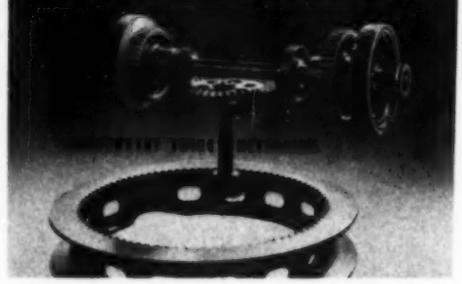
Selection of Personnel

The first consideration of the contractor should be the selection of a superintendent and foremen who are alive to the necessity of making the job safe. In the event a foreman experiences frequent accidents, he should be criticised, and should the frequency continue, his services should be terminated. Second, in selecting mechanics and laborers, an examination should be made to make sure that the man is physically fit for the work, and in the event any workman experiences frequent accidents, the cause should be investigated and the difficulty remedied. Third, a first-aid meeting of the foremen should be called at noon-time after any serious accident has occurred, and at least once a week, at which meeting the accidents experienced should be discussed and remedies suggested by the superintendent.

First-Aid Cabinet Necessary

Fourth, a first-aid cabinet should be available at some easily accessible location. The cabinet should contain all supplies needed in first-aid work and should be in charge of a person competent to render first-aid treatment properly and effectively, whose services are immediately available at

Here's why BYERS Cranes can swing at any time while *Travelling or Steering*



It's not necessary for cranes to be so "muscle bound" that they cannot respond instantly with any operation required to perform a given task. For instance, —

Shifting, or converting a set of swinging clutches to pinch hit as travel clutches wastes time, loses precious minutes every day, and handicaps the productive capacity of crane and operator.

That's why all Byers cranes are designed to hoist while they swing, while they travel, while they steer.

Particularly on crane, pile driving, dragline and trench hoe service where frequent moving is essential, Byers offers you and your operator freedom of action that expe-

Specify **BYERS** CRANES and SHOVELS RAVENNA OHIO

DISTRIBUTORS THROUGHOUT THE WORLD

WARTIME HELP

for highway departments and construction companies

NEW, *FREE* MANUAL SHOWS HOW TO DO 4 JOBS WITH ONLY 1 MATERIAL!

Here's a tip to help you meet your wartime maintenance needs . . . use that four-purpose automotive detergent, OAKITE PENETRANT, for EASILY, QUICKLY, SAFELY handling these FOUR important jobs:

1. **Cleaning cooling systems**
2. **Degreasing repair parts**
3. **Steam-detergent cleaning**
4. **Washing garage floors**

NEW, 12-page manual gives formulas and directions. Write for your FREE copy TODAY!

OAKITE PRODUCTS, INC.
24G Thames Street, NEW YORK, N. Y.
Technical Service Representatives in All Principal Cities of the United States and Canada

all times. Many apparently minor accidents have developed into serious cases of infections. Superintendents and foremen should report every accident to the proper authority in the manner provided in their organization and enter it in the accident record. If there is the slightest indication of infection, the injured man should be sent to a physician. Arrangement should always be made with several competent physicians so that their services may be available and may be procured with the least possible delay when an accident occurs. Their addresses and telephone numbers should be posted in a conspicuous place near the first-aid kit.

Accident Prevention

Two kinds of accidents are peculiar to concrete work and different from accidents on other construction. These injuries are punctures by nails, and cement burns. Nail punctures are by far the most numerous minor accidents. First-aid attention to all accidents is important, but it is particularly important for nail puncture accidents. Fifth, attention should be given to the shoes the men are wearing, and if a workman has thin soled shoes he should be warned to get heavy ones, preferably safety shoes, or he should be discharged. Sixth, the men carrying cement should be required to wear shirts and gloves to prevent dermatitis. They should be instructed to wash their hands before eating at lunch-time.

Accident Record on Three Concrete Jobs

The following is a table showing the accident record of three concrete jobs alike in character of construction and organization, except that on No. 1 there was a doctor, and excellent first-aid personnel, and equipment immediately at all times on the job, whereas on job Nos. 2 and 3, accident cases were sent to two nearby doctors for treatment, with first-aid only by timekeepers or clerks.

	General Contract Labor and Material	$1,924,000
	Man Days Worked	$75,000
	Total Accidents	419
No. 1	Man Days Lost	921
	Accident Working Days	1/178
	Lost Time Accident Working Days	1/810
	Days Lost Working Days	1/82
	General Contract Labor and Material	$1,369,000
	Man Days Worked	$67,000
	Total Accidents	221
No. 2	Man Days Lost	1722
	Accident Working Days	1/303
	Lost Time Accident Working Days	1/609
	Days Lost Working Days	1/39

(Continued on page 108)

Granddaddy OF THE JEEP

A Marmon-Herrington *All-Wheel-Drive* converted Ford is credited with being the prototype of the army Jeep, by Earl Godwin in his Ford Motor Company's radio program "Watch the World Go By," on March 15th.

In September 1936, Marmon-Herrington engineers produced the first half-ton passenger-carrying vehicle having power and traction applied through all four wheels. This was a standard Ford "pick-up" truck converted to *All-Wheel-Drive* in the Marmon-Herrington plant. "The Jeep," said Earl Godwin, "merely applies the same principles of design to still smaller and lighter (¼-ton) vehicles."

This company's greatest contribution to the war effort has not been production, although thousands of trucks, tractors and tanks of our manufacture are now serving the United Nations on all fronts. Of far greater importance, in our opinion, have been the many "firsts" in concept and engineering developments which we have passed along to others having greater output facilities for actual production.

The same genius which created the first conversions of mass-production vehicles to *All-Wheel-Drive*, the first high speed track-laying tractor, and the first half-track truck with driving front axle, will provide outstanding advancements in civilian vehicles, too, after this war is won.

HELP SPEED "V" DAY, THE BOND SAVINGS WAY!

MARMON-HERRINGTON

All-Wheel-Drive

MARMON-HERRINGTON CO., Inc.

INDIANAPOLIS, INDIANA Cable Address: MARTON

C. H. & E.

CONTRACTORS' EQUIPMENT

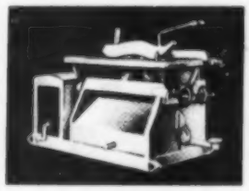
SINCE 1908 C. H. & E. equipment has been efficiently serving the Construction Industry. Pictured are just a few C. H. & E. Products that are now aiding the war effort.

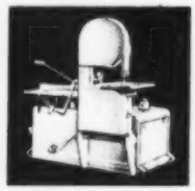
The No. 31 Saw Rig is designed for rapid production work. Can be furnished as a rip and cross cut unit only or with Band Saw and Jointer attachment. Frame and skid of one piece welded construction. All safety devices. *The No. 33 Saw Rig* includes every desirable feature and brings stationary woodworking tool advantages into a portable machine.

The 20-inch Band Saw serves as a stationary shop tool or as a portable unit on the job, especially for cutting curved forms. Can also be used as an attachment on C. H. & E. Saw Rigs. Our new catalog gives details and specifications — send for it.

SAW RIGS • PUMPS • HOISTS • MORTAR MIXERS • ROLLERS • BAR BENDERS • BAR CUTTERS

No. 31 Saw Rig


No. 33 Saw Rig


No. 33 Saw Rig with Band Saw

20-inch Band Saw

C. H. & E. Manufacturing Company

3847 N. Palmer St. Milwaukee, Wis.

So Useful, It's More Than a Jack!

Simplex No. 310-A, 15-tons capacity; 22" high; 13" lift. Toe lifts from minimum of 2¼". Weight 74 lbs.

The Simplex 310-A Emergency Jack, together with its accessories—5-ft. grab hook chain and adjustable cap shoe—does jobs the easy way. Lifts from below floor level (using chain); tilts on its base for angle jacking, razing walls, etc.; pushes horizontally. Corrugated toe lift. Slightly convex base grips floor under load.

Templeton, Kenly & Co., Chicago, Ill.
Better, Safer Construction Jacks Since 1899

Make Your Jacks Last Longer!
Give them proper lubrication and care. Bulletin tells how.

Simplex LEVER SCREW HYDRAULIC **Jacks**

(Continued from page 107)

	General Contract Labor and Material	$1,112,000
	Man Days Worked	$46,000
	Total Accidents	217
No. 3	Man Days Lost	1460
	Accident Working Days	1/211
	Lost Time Accident Working Days	1/462
	Days Lost Working Days	1/31

This shows that on the job with good first-aid organization, a much larger percentage of accidents is recorded, but the number of days lost on account of accidents was reduced more than 50 percent. The accidents on all these jobs were largely nail punctures. On job No. 1 the wounds were cut open, cleaned out and sterilized immediately. Other injuries, no matter how slight, were treated at once. The result was that on job No. 1 the cost of accidents to the contractor was actually much less and the rate paid to the insurance company was slightly less than on the other two jobs. The exact amount is of no interest when tabulated, because the jobs were in three different states where the insurance rates were different.

★ ★ ★

NEWS FROM MANUFACTURERS *About Their Products*

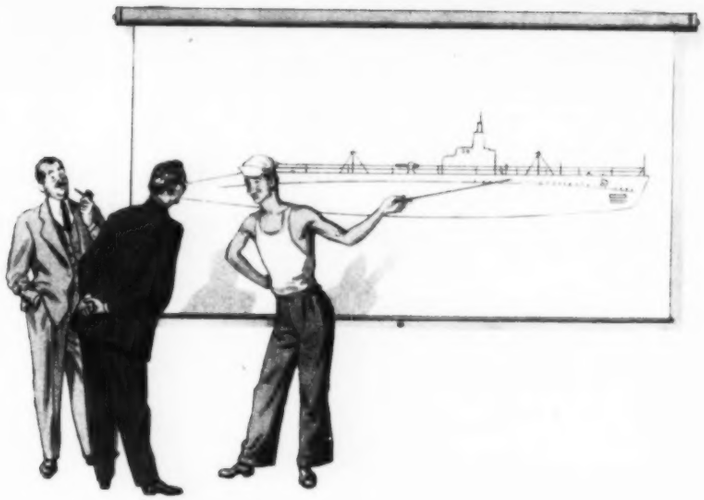
The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

DE-SCALING MANUAL—**Oakite Products, Inc.**, 22 Thames St., New York City. (24 pp., illustrated.) Describes specially developed material, known as Oakite compound No. 32, for safely removing lime scale and rust deposits from water-cooled equipment. Reported to provide wider margin of safety in de-scaling diesel and gasoline engine cooling systems, water-cooled air compressors and other water-cooled equipment than is possible with commercial raw acids. It is also said to restore normal heat transfer efficiency more quickly and easily by eliminating need for tedious, time-consuming mechanical methods usually required on scale and rust-removal work. Also reviewed in manual are various methods of application and other data. Free copies available on request.

★ ★ ★

PORTABLE WHEEL TYPE ASPHALT MIXING PLANT—**Iowa Manufacturing Co.**, Cedar Rapids, Iowa. (12-p. bulletin, illustrated) Describes new Model E asphalt plant, electric, gas or diesel driven, which turns out large quantities of hot or cold bituminous mix right on the job and then is moved easily to next location. Electric driven plant is equipped with individually mounted motors, in some cases with built-in speed reducer units. If gasoline and diesel engines are used, two are required, one to drive tower units and one to drive drier

This submarine of the U. S. fleet Must keep its Diesels running sweet . . .



. . . use RPM DELO, used by the United States Navy to lubricate the powerful Diesels in our submarines and other warships.

These drawings, from actual photographs in our files, reveal the difference between two pistons, each run 846 hours in a test. One was lubricated with the finest straight mineral oil available, yet its rings were stuck with gum and the skirt was varnished.

The other, lubricated by RPM DELO, was protected by the non-corrosive, anti-oxidant properties that make "RPM" the world's finest Diesel oil. Put RPM DELO to the test in your own Diesels. You, too, will see how it retards ring-sticking and varnishing.

RPM DELO

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under the following names:

RPM DELO • Caltex RPM DELO • Kyso RPM DELO

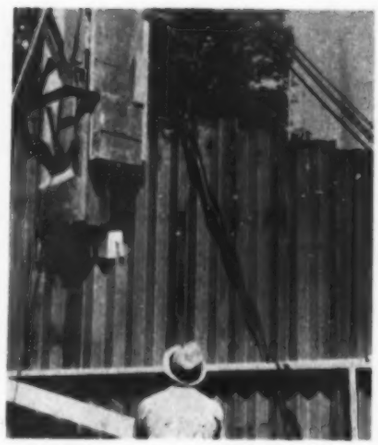
Signal RPM DELO • Imperial-RPM DELO • Sohio RPM DELO

CONCENTRATE

Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

STANDARD OIL COMPANY OF CALIFORNIA

IT DOES THE JOB
Without Wasting Steel



Steel is too precious to be wasted, even on important war projects. When metal sheeting *must* be used, ARMCO can show you how to do a good job and not waste steel.

Light-weight ARMCO Sheeting carries no excess metal. Lengthwise corrugations provide a stiff backbone—help it to stand up straight without flinching under driving blows. Fewer sections are needed because this sheeting can readily be pulled and used over and over again.

There are time-and-labor savings too. ARMCO Sheeting goes in fast owing to its smooth surface and small displacement. It is also nestable, simplifying storage and shipping.

Order ARMCO Steel Sheeting in the exact gage and width you need. It is supplied in the following types: Flange (12 in. width, 12 to 3 gage, max. length 18 ft.), Clip (12 in. width, 12 to 10 gage, max. length 16 ft.), Interlocking (14 in. width, 12 to 7 gage, max. length 18 ft.). Armco Drainage Products Association, 355 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO SHEETING

WOOD PRESERVATION – **I. F. Laucks, Inc.**, Seattle, Wash. (8-p. illustrated brochure.) Growing necessity for wood preservation has prompted this company to issue a booklet directed toward constructors of heavy laminated beams and arches, as well as manufacturers of sash, doors, plywood and other wood products in which is explained company's complete series of low-cost wood treatments for plant application. Among those are water repellent toxic preservatives which meet the requirements of National Door Manufacturers' Association and Western Pine Association.

★ ★ ★

VERTICAL AXIAL AND MIXED FLOW PUMPS – **Ingersoll-Rand Co.**, 11 Broadway, New York City. (20 pp., illustrated.) Describes these units designed for pumping large volumes of liquid at comparatively low heads and available in complete range of sizes for capacities to 75,000 gpm. and for heads to 100 ft. per stage. These pumps are said to be particularly well suited for such services as condenser circulating, mine and general sump drainage, dry-dock dewatering, process work, bulk liquid transfer, irrigation, flood control and refinery processes. Among illustrations are several large cross-sectional views showing many features of design and construction.

★ ★ ★

LOWER EARTH-MOVING COSTS – **R. G. LeTourneau, Inc.**, Peoria, Ill. (8 pp., illustrated.) Latest of a current series of service brochures intended to show the way to earthmovers to lower costs in war and peace. Complete shop service, rapid repair aid, dealer help in job planning, use of factory instruction books, service charts and other pamphlets on operation, tire and parts conservation, training of "green" operators and many other subjects are fully explained. Brochure may be obtained by asking for Form A-36, earthmoving specialist folder.

★ ★ ★

CORROSION DATA WORK SHEET—**Technical Service, The International Nickel Co.**, 67 Wall St., New York City. (4-p. folder.) Designed to assist executives and engineers in their study of corrosion problems, work sheet acts as a check list to insure consideration and evaluation of all factors influencing corrosive action. It also permits ready comparison of a problem with similar ones which may be used as a guide for selecting material possessing a satisfactory resistance. Copies of this sheet may be obtained without charge upon application to the Technical Service of the above company.

★ ★ ★

WELDING-CUTTING OPERATORS' HANDBOOK – **International Acetylene Association**, 30 E. 42nd St., New York City. (20 pp., pocket size, illustrated.) Helpful step in instructing users of oxyacetylene welding and cutting apparatus how to prolong life of their equipment is this booklet written in an easy-to-understand style and containing a list of concise do's and don't's for the man who wields the blowpipe. Other valuable information and suggestions on care and maintenance of blowpipes, regulators and welding and cutting accessories. Copies of this booklet may be obtained in reasonable quantities without charge from any manufacturer of oxygen, acetylene, carbide or welding and cutting apparatus and supplies.

● **Here's the one-man MALL Electric Geared Head Vibrator that is saving man hours, time and materials on War Construction jobs.**

This big capacity unit is recommended for placing large masses of low-water-cement-ratio concrete for dams, locks, piers and other heavy construction. Operates 2⅜"x19" concrete vibrating element. It is easily carried by one man anywhere on the job and provides super-power for every application. Other gasoline-powered, electric and pneumatic units 1½ H.P. to 3 H.P. are available for Victory Construction.

Full information will be mailed upon request.

★★ *THROW YOUR SCRAP INTO THE FIGHT*

MALL TOOL COMPANY
7757 South Chicago Ave., Chicago, Illinois

EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey

METAL CUTTING OPERATORS TOOL MANUAL – **McKenna Metals Co.** 128 Lloyd Ave., Latrobe, Pa. (52 pp., illustrated). Vest pocket edition contains information on care, handling and efficient methods of using "Kennametal" tools. More than 100 drawings illustrate tool applications, operations, tool styles and instructions for grinding, tool design and brazing blanks to used shanks to make tools in operator's own shop. Presents tables on grinding wheel recommendations, suggested speeds of operation in relation to hardness of workpiece, proper chip breaker dimensions and correct grade selection.

★ ★ ★

JACK MAINTENANCE MANUAL – **Duff-Norton Mfg. Co.,** Pittsburgh, Pa. (16 pp., illustrated). Titled "Maintenance and Safety Hints," this publication includes seven pages of jack hints on proper use of jacks for best and safest results. Special section is devoted to problems of individual fields, including industrial plants, railroads, mines and shipyards. Treated also are basic types of mechanical jacks – screw and ratchet – how they operate, construction details and description of various parts, together with explanatory diagrams. Instructions for prospective jack buyers on how to select right jack for specific job. Copies available to all mechanical jack users without cost.

★ ★ ★

VALVE GRINDING EQUIPMENT – **The Cooper-Bessemer Corp.,** Mt. Vernon, Ohio. (6-p. folder, illustrated). Entitled "Recommended Valve Seat Grinding Equipment" describes and pictures equipment best suited for grinding valve seats and valve faces in various types of Cooper-Bessemer engines. Basic set of tools comprising complete outfit are itemized: (a) High speed driver; (b) valve grinder; (c) dressing tool and pilot; (d) valve seat indicator; (e) pin for removing tapered pilots; and (f) grinding wheel holders.

★ ★ ★

DC SINGLE-OPERATOR ARC WELDERS – **General Electric Co.,** Schenectady, N.Y. (12 pp., illustrated). Bulletin describes operation of these engine-and-motor-driven welders and cut-away illustrations show both types of welders at work. Also lists six important advantages of Type WD welders – ease of starting, smooth, steady performance, broad current range, high rate of production and low operating and maintenance costs.

★ ★ ★

TECHNIQUE OF PLYWOOD – **I. F. Laucks, Inc.,** 911 Western, Seattle, Wash. (250-p. book). Growing universal interest in Plywood, now especially important because of its numerous war uses, has created an unusual demand for this technical manual now in its third printing. Written by Charles B. Norris, formerly chief engineer for Lauxite Corp., of Lockport, N.Y., and now principal engineer in division of Timber Mechanics at U.S. Forest Products Laboratory, this book is intended primarily for engineers, designers and users of plywood and covers all phases of plywood manufacture. Also contains chapter on "General Scientific Principles of Gluing" written by I. F. Laucks.

★ ★ ★

SOIL STABILIZATION – **Seaman Motors,** 305 N. 25th St., Milwaukee, Wis. (40-p. book). Covers techniques used in soil-cement, bituminous, calcium-chloride, sand-clay and other processes with emphasis placed on military airport and runway construction. Also stresses highway maintenance and repair.

IN SHIPYARDS . . . BRIDGE AND STEEL ERECTION . . . BUILDING CONSTRUCTION . . . TUNNELING . . . QUARRYING . . . LUMBERING . . . MINING . . . STEEL MILLS . . . CHEMICAL PLANTS AND MANY SPECIAL FIELDS

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Peacetime's most popular work hat is doing a *bigger* job in war—answering the call for proved head protection in every stepped-up industry where head hazards threaten—saving priceless man-hours for higher war production. M.S.A. Skullgards interpose the strength of laminated bakelite between danger and the worker's head—do not soften or deteriorate from exposure to water, oil, heat or ordinary chemicals, and are non-conductive to electricity. See for yourself their light-weight *comfort*—write for a demonstration!

For outstanding production achievement . . . the Maritime "M" Pennant and Victory Fleet Flag, awarded to M.S.A. by the U. S. Maritime Commission.

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and other material handling machines are famous for long life and sustained efficiency.

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AMERICAN TERRY DERRICK CO. South Kearny, N. J.

DESIGNING TIMBER STRUCTURES — **National Lumber Mfrs. Assn.,** Washington, D. C. (48 detailed drawings, 11x7 in.) A compilation representing a series of detailed drawings selected by the Teco Engineering staff from their collection of several hundred designs prepared in the course of practical work on actual timber engineering problems. These plans cover 14 different types of construction, such as trussed rafters for housing projects; trusses for hangars, factories, and markets; grandstands; distilling racks; bridges, and towers. A photograph of an actual structure in which that particular type of design is used precedes the group of detailed drawings representing that type. Included in the book—which is a "loose-leaf" binder to make easy the insertion of further drawings, as well as to make each sheet more available for ready utilization—are "Handy Tables for Use in Timber Design" taken from the National Lumber Manufacturers Association's publication, "Wood Structural Design Data."

★ ★ ★

FERROUS AND NON-FERROUS PIPING—**Air Reduction Co.,** 60 E. 42nd St., New York City. (16 pp., illustrated). "The Welding of Piping" comprises a series of articles prepared by this company's Applied Engineering Department. Covers various types of this piping, their dimensions, fabrication, and estimates of welding and labor costs.

★ ★ ★

EXPANSION BOLTS AND ANCHORS—**American Expansion Bolt & Mfg. Co.,** 903 N. Spalding Ave., Chicago, Ill. (25 pp., illustrated, colored) Lists types and uses of expansion bolts and anchors and accessories for highway, industrial and general use. Describes and illustrates American Expansion Anchor method of anchoring new concrete to old in widening, repairing and resurfacing of existing concrete highways. Other subjects treated: Hook inserts and T-bolts for lane-at-a-time construction of highways and aircraft runways; tie bars for double-lane center joint construction; slip rods for uniform transfer of load in transverse joints; "Lok" forms for divisional lanes and for resurfacing; hook bolts for Gunite work; anchors for new Gunite construction; expansion bolts for seating and general use and for remodeling; expansive screw anchors for putting thread in masonry where needed; toggle bolts for making attachments to hollow walls; special bent bolts; tools and drills.

★ ★ ★

"MUST" ON RUBBER SAVING—**B. F. Goodrich Co., Akron, Ohio.** So that all workers may understand the ways of making our dwindling stocks of rubber stretch as far as possible, the B. F. Goodrich Co. has had printed an easily-read wall card containing this important information.

★ ★ ★

AUTOMATIC BATTERY CHARGING EQUIPMENT—**General Electric Co.,** Schenectady, N. Y. (8-p. bulletin, illustrated) Describes in detail this equipment for motive-power batteries, including single battery control, multiple circuit battery control, and motor-generator sets. Of special interest to those in charge of street trucks, electric industrial trucks, battery-propelled electric locomotives, railway-car lighting and air conditioning. Bulletin also describes G-E charge-control units for automatically discontinuing charging of batteries when they have received correct amount. There are also a number of illustrations with brief descriptions, of both open and closed panels. Included is table for determining approximate kw. rating of a generator for charging any number of batteries of same size by modified constant-potential method.

DIAPHRAGM PUMP MANUALS – **Novo Engine Co.**, Lansing, Mich. (42 pp., for 3-in. pump and 47 pp. for 4-in. pump, both illustrated). Prepared to meet demands by War Department for complete operating and maintenance manual dealing with 3-in. and 4-in. models of diaphragm pumps. These booklets are divided into three plainly indexed sections, first an operator's manual giving the kinds of jobs best handled by this type of pump, the proper method of installation, lubrication charts, things to watch out for and to check, minor repairs that can be made on the job such as changing diaphragms and valves, clean out, etc. This part of the book is illustrated with photographs showing how best to perform these operations. The second section is the maintenance manual, showing how to perform the more intricate repairs and adjustments. Reference numbers make it easy to identify each part for tear down and assembly. The third section is a parts list. Each part is illustrated completely and in its proper order as it fits into the assembly. The use of reference numbers on the illustration, coordinated with parts numbers and descriptions make it easy to pick out the part that is needed, part number and the quantity used.

★ ★ ★

CONCRETE FORM WORK – **Richmond Screw Anchor Co., Inc.**, 816 Liberty Ave., Brooklyn, N. Y. (31 pp., illustrated). A booklet entitled "Form-Ty Engineering Guide," just issued, gives complete information on concrete form work. It contains more than 100 different types of form-tying devices and accessories, with cost data, and is designed to fill the need for faster, better, less costly concrete construction.

★ ★ ★

HARD-FACING – **Coast Metals, Inc.**, 2 W. 45th St., New York City, (12 pp., illustrated). Tells how to make equipment last longer, restoring worn parts to original dimensions by means of welded overlay of wear-resistant alloy claimed to make hard-faced part more serviceable than new. Discusses preparation of work, methods of application, properties of hard-facing rods and examples of outstanding performance. Listed are various rods to use on different applications.

★ ★ ★

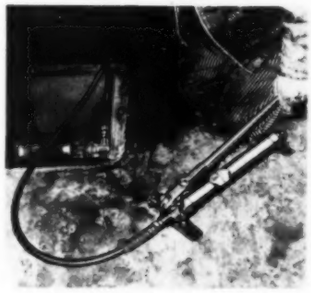
CONSTRUCTION EQUIPMENT – **Chicago Pneumatic Tool Co.**, 6 E. 44th St., New York City (64 pp., illustrated). Convenient reference book covering equipment available for practically every type of time- and labor-saving operation, such as compressors, diesel engines, rock drills, wagon drills, demolition tools, diamond drills, pneumatic tools, concrete vibrators and electric tools. Section on care and maintenance of pneumatic tools.

★ ★ ★

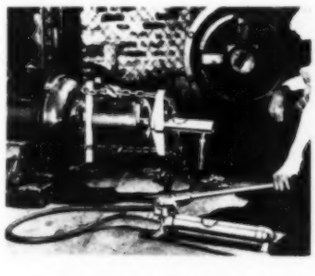
ASBESTOS-CEMENT CONDUIT – **The Philip Carey Mfg. Co.**, Lockland, Cincinnati, Ohio. (12 pp., illustrated). Describes new product used principally for cable installation and claimed to meet demand for earth enveloped duct system that is permanent, trouble-free and proportionately inexpensive in its initial installation. Lists advantages of new "Flexcaulk" coupling made expressly for and supplied with conduit to facilitate field assembly of short lengths of complete duct runs or fabrication of radius sweeps for clearing fixed obstructions. Gives specifications, results of various endurance and functional tests and methods of installation.

YOU CAN "Out-Super" SUPERMAN

With the Power of Porto-Power in Your Hands!



A Kaiser shipyard worker uses a 7-ton Porto-Power ram to push out a close-fitting pin from a rudder assembly. Note the cramped quarters.



Porto-Power is available in 7, 10, 20 and 50 ton sizes. Workman operates hand pump while ram, with standard attachments, pulls off drive pulley. Porto-Power replaces sledging, prying and other dangerous, damaging methods.

Just think! If your own hands had from 7 to 50 tons of power — and you could use them with the same ease, flexibility and control as you do now — WHAT A MAN YOU'D BE! Toughest push, pull, clamp, twist, spread, lift and press jobs would be "duck soup" for you — even in cramped quarters.

"Porto-Power" does put that miracle power in your hands! It gives *you* — the construction worker, maintenance man, or anyone else — just what you need to speed up any type of construction and equipment maintenance the better, easier, Hydraulic Way.

Porto-Power is fast becoming "standard equipment" for maintenance crews, chief electricians, contractors, shipbuilders and production lines. Write Blackhawk or call your Industrial Supply Distributor for details.

***A Product of* BLACKHAWK MFG. CO.**
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HYDRAULIC EQUIPMENT — WRENCHES

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RUSH catalogs on Porto-Power and other Blackhawk time and labor saving equipment.
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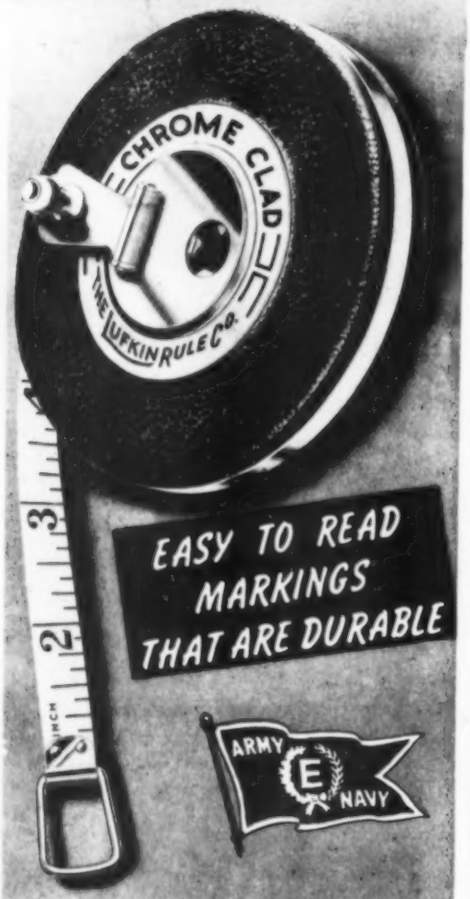
"LEADER"—
CHROME CLAD STEEL TAPES FOR *busy* CONTRACTORS



Tired of trying to use a hard-to-read, old fashioned steel tape? Then now's the time to get a new Lufkin "Leader"—the tape with the Chrome Clad line that contractors everywhere are praising. Jet black markings show up prominently against a satin-chrome surface that won't rust, crack, chip or peel. The "Leader" will be your most useful tool. Order it from your dealer today. Write for free Catalog.

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SAGINAW, MICHIGAN • New York City

TAPES . RULES . PRECISION TOOLS

REDWOOD PIPE—**California Redwood Assoc.**, 405 Montgomery St., San Francisco, Calif. (16-p. bulletin) "How to" information for engineers and contractors in regard to Redwood pipe now in demand to replace steel units on western sewage, drainage and water supply and distribution systems and for irrigation and hydro-electric supply lines. Consolidates and brings up to date previous technical information on this pipe and covers both eastern and western practices in wood-pipe construction. By tables, text and drawings, bulletin gives instruction on four types of Redwod pipe: continuous stave pipe, machine banded pipe, bored pipe and Redwood lined metal pipe. Advantages listed: costs less than any other pipe of equal efficiency; flow capacity greater than that of metal pipe and does not decrease with age; costs less to ship, haul and handle as it is transported knocked down, not affected by electrolysis as it is a non-conductor; has stood years of service in moist, hot or extremely dry climates; non-conductor of heat; will not freeze under temperatures that would burst metal pipe; neither expands nor contracts with heat or cold, consequently does not require expensive expansion joints or curvatures; can be laid on surface in any climate or can be buried.

★ ★ ★

VIBRATION ELIMINATORS—**The B.F. Goodrich Co.**, Akron, Ohio. (12 pp. illustrated two color) Catalog section on Vibro-Insulators, devices of rubber and metal, has just been revised and reprinted and may be obtained together with copies of work sheet upon request of those interested in problems of isolating vibration, shock or noise. According to Goodrich Co., in order to attack problem requiring Vibro-Insulators, every factor regarding location of equipment, motivating power, frequency of vibration and other questions must be known. New work sheet aids in compiling this data. When filled out by an engineer or plant superintendent, sheet gives company all information needed to recommend proper type of Vibro-Insulator.

★ ★ ★

Engineer Corps Seeks to Enlist Monthly *9,000 Construction Specialists*

(Continued from page 45)

trained civilians who, as the Army's emergency construction program tapers off, are becoming subject to the draft. Thus earmarked for the Engineers, they can be advanced in grade as rapidly as their special training justifies. They will have the same opportunity to obtain commissions through the Engineer Officer Candidate School as other enlisted men; but their previous training should allow them to speed up the normal process. The plan goes into effect

(Continued on page 116)

Try them on your toughest problems!

What is the most difficult structural engineering problem now facing you? Whatever it is, somewhere in the Hool and Kinne Library you will find a full and complete answer. In these books no detail is overlooked; and there is no broad fundamental that hasn't a clear-cut, informative treatment. For years, the Library has been providing structural engineers with the facts they need on *every problem concerned with the design and construction of civil engineering structures.* When you consult this Library you are availing yourself of the services of 54 recognized structural engineering specialists.

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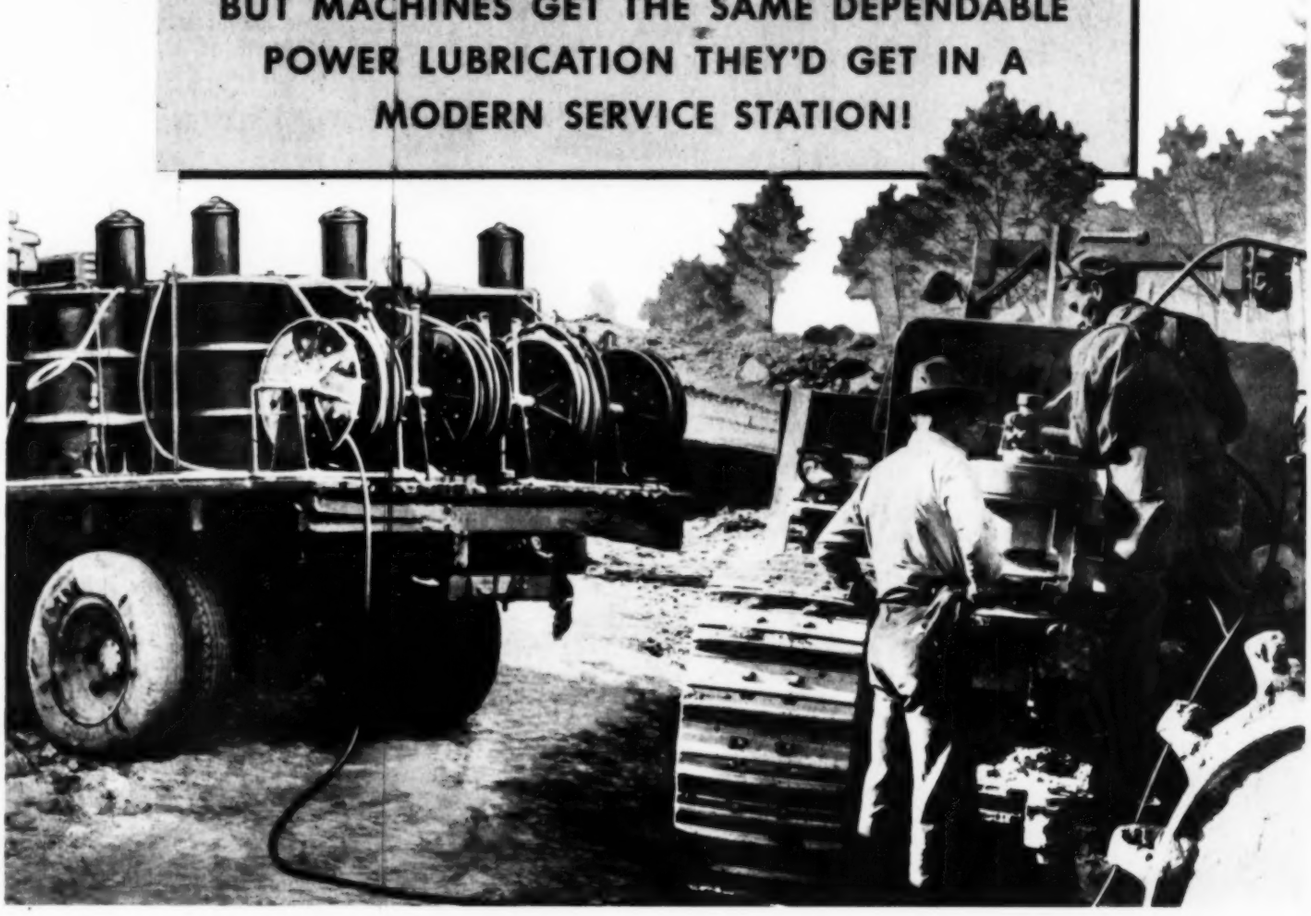

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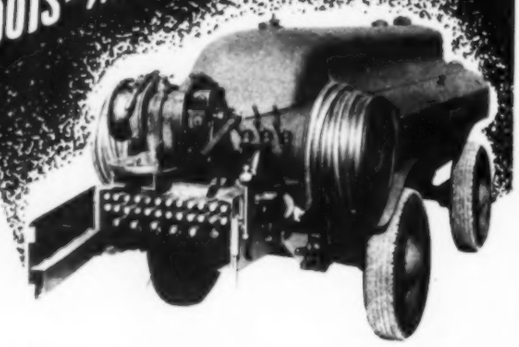

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Equipment includes: Double hose reels, live air type, each equipped with three 50 ft. lengths of ¾" air hose. Air receiver with three extra outlets, equipped with quick action valves, hose couplings and 3½" vise for flat or pipe work, on swivel base. Tools recommended depend entirely on users' requirements and the ability of tool manufacturer to furnish them under existing conditions.

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ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICH.

(Continued from page 114)

immediately, and Engineer officers are making every effort to enlist as many as possible.

All men in the New York City Area who are interested in volunteering for induction in the Engineer Corps through this program will be interviewed at the Military Personnel Branch of the North Atlantic Division, Corps of Engineers, 270 Broadway, New York City.

★ ★ ★

Steel Ship Forepeak Welded Into *54-Ton Assembly*

(Continued from page 55)

ahold of the rivet, you had to maneuver around like a monkey to get in position to 'buck it'."

Aside from the physical handicaps of using rivets, there were many mechanical disadvantages. For example, there was usually a movement or shifting of the plates when the forepeak section was lifted by the cranes, and this meant replacing rivets to get the plates back in place. And if some of the plates didn't fit properly, it was a difficult task pulling them together with rivets. Needless to say, the cost of man-hours was terrific.

As explained by our layout superintendent, C. S. Sorenson, Calship used to rivet the plating or shell to the flanges of the frames. Then, by slight changes in engineering, it was found feasible to weld the frames to the shell. This change effected a saving of man-hours, inasmuch as the riveting method required the drilling of holes in both the plates and the flanges of the frames. Besides taking extra time, this process led to the possibility of error due to the human element in the lining up of one hole to another, causing much reaming and fitting. The question of absolute rigidity also entered into the riveting method, there being present the possibility of some shifting from proper dimensions, particularly when the finished forepeak was turned and lifted to the hull.

The welded method, besides saving in man-hours, lends itself to a better engineered job. It also leads to a considerable saving in weight, for by welding, all the flanges of the frames have been removed. No particular layout or fairing is required other than to hold certain water lines and common molded lines, effecting many

(Continued on page 118)

NEVER BEFORE IN ANY WAR—
BARRAGE BALLOONS
nor
these modern "steel muscles"
that hold them in place . . .

Preformed wire rope

Half the battle, in the performance of this great modern defensive weapon, is the part played by Preformed Wire Rope—not only the anchor lines which hold these balloons captive, but the steel tentacles that entangle and destroy invading planes.

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4401 NORTH RAVENSWOOD AVE.
CHICAGO, ILLINOIS

(Continued from page 116)

hours saving in fitting. After the structure has been completely production welded there is absolutely no chance of any change in shape from general dimensions, and therefore, when the forepeak arrives on the hull, it fits accurately.

In order to decrease the lapsed time from keel-laying to launching, certain departures from conventional and precedented construction schedules have been materially changed in these new welded ships. Any section of the hull or decks which can be "unit-constructed" on the ground and assembled to its proper place on the ways, has been so engineered as to facilitate the production to this end. Naturally, such pieces as tank tops—second and upper deck—side shell, bulkheads, tanks and many other miscellaneous parts offered no great difficulty in assembly.

But two sections of the ship did cause difficulty—the forepeak and the afterpeak. We built the first four ships by erecting these sections on the hulls. However, by carefully analyzing the construction problems and comparing estimated man-hours, we finally concluded that these sections could be unit-assembled on the ground and placed in position on the hull at the proper time, thereby saving many valuable hours of production.

Sequence of Operations

The accompanying photographs illustrate the sequence of operations in fabricating a forepeak which is built up, by welding, with the bulkhead supported in a horizontal position on cribbing, as shown in the sketch. The completed assembly weighs 54 tons and requires three cranes to turn it into an upright position for incorporation into the hull of the ship.

★ ★ ★

Maintaining Roads

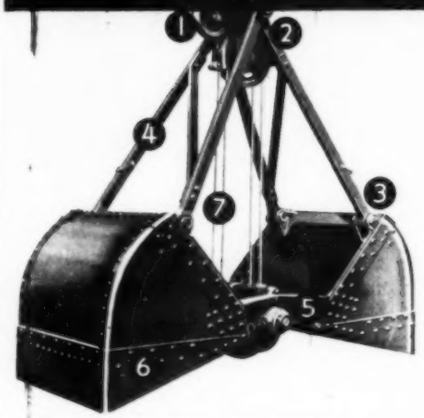
For Britain's Army

(Continued from page 63)

structure of the road itself. Cast-iron gully gratings placed in the channel have especially suffered, for few of them are strong enough to withstand the passage of heavy steel-tired vehicles. The same is true to a lesser extent of manhole covers and curbs, concrete ones in particular. Damage to curbs, whether of refuges or sidewalks, and to lamp posts, bollards

(Continued on page 119)

SEVEN FACTS IT WILL PAY YOU TO KNOW ABOUT BROWNHOIST BUCKETS



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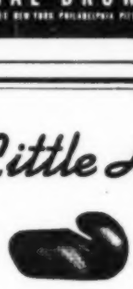

. . . that gives the Coffing "Safety Pull" Ratchet Lever Hoist superiority.

One little hook that will give you an easily converted double-power and double-duty hoist.

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Manufacturers of

RATCHET LEVER, SPUR GEARED, ELECTRIC AND DIFFERENTIAL HOISTS
TROLLEYS UTILITY MAINTENANCE TOOLS

DANVILLE, ILLINOIS

and so on, is due less to the type of vehicle than to the lack of skill or care exercised by the driver.

The most damaging of military vehicles is, of course, the tank — not so much on a straight run, despite its heavy weight, as in the slewing action of its crawler track in making sharp turns. Near tank parks and training grounds much destruction has been caused by this type of vehicle, though happily confined within relatively small areas. Bituminous macadam roads at turning places have been badly cut up and even well constructed concrete roads have suffered, especially when finished off with a roughened surface.

In some cases a remedy has been found in the application of a 1½-in. coat of mastic asphalt, but research is still in progress to devise methods of concrete construction which will effectually provide greater resistance to damage by tank traffic of this nature. A smooth finish is helpful, but is a potential cause of skidding to fast-moving rubber-tired vehicles using the same route.

A contributory cause of damage to road surfaces, coupled with inconvenience and even danger to other road users, is caused by the deposit of mud carried on crawler tracks from adjacent land. As a temporary measure there is no alternative for immediate cleansing, but where such traffic is likely to be prolonged it has been found useful to provide a concrete road of sufficient length for the mud to work off before vehicles enter the public highway.

Bridges Take Excess Loads

A word about bridges. Some thousands of the highway bridges in Britain are privately owned — generally by railway and canal companies — and large numbers have been regarded as incapable of safely carrying weights in excess of the normal local traffic. Prior to the war research was in progress on the actual as compared to the theoretical strength of bridges. Tests, sometimes carried to destruction, have shown that the strength of cast-iron girder and masonry arch bridges is generally greater than was realized. Comparatively few bridges on routes of any importance are incapable of carrying even the heaviest tanks, provided they are not subjected to repetitive loads within a short space of time. Where doubts exist or bridges are likely to be needed for military operations, they have been strengthened, permanently if possible, or otherwise by temporary measures.

Overbridges sometimes have inadequate headroom or width for vehicles carrying loads of unusual dimensions, such as airplane parts. Occasionally,

(Continued on page 120)

KEEP CONSTRUCTION HORSEPOWER ON FULL TIME WITH AMALIE MOTOR OIL

Preventing breakdowns before they happen is an important part of keeping vital bulldozers, scrapers and power shovels in full time operation. And an important part of preventive maintenance is the regular use of AMALIE Pennsylvania Motor Oil.

Because of its Greater Oiliness* AMALIE is doing a time-and-money-saving job for thousands of overworked gasoline and Diesel engines. Made from the highest grade Pennsylvania crude, AMALIE's extra oiliness* is safeguarded by straight-run refining methods which are exclusive with this Company. Experience dating back more than sixty-two years has helped to make a fine product steadily better.

Write Dept. C160 for your FREE copy of our manual—"Lubrication Data on Contractors' Equipment"—approved by equipment makers.

*The Sperry-Cammen Adheroscope test ranks straight-run Pennsylvania Oils highest in oiliness.

AMALIE PENNSYLVANIA MOTOR OIL

Product of DAUGHERTY REFINERY
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"Straddledeck" TRAILERS

meet SPECIAL NEEDS

Bulky, cumbersome machinery, and of late heavy pieces of defense equipment must be moved from place to place.

In some localities, where low headroom is encountered, this type of Rogers Trailer is used extensively.

Large machines, with crawler treads "straddle" the girders thus lowering the overall height by several inches, a definite advantage also in handling many kinds of equipment.

ROGERS LOW BED -HEAVY DUTY TRAILERS

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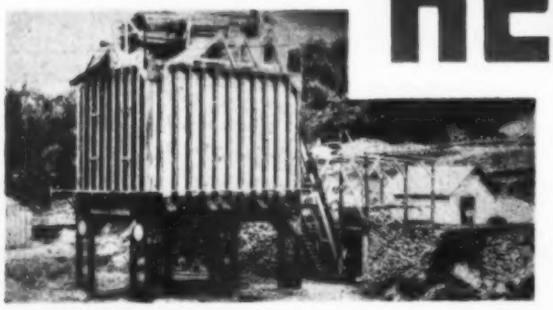
Either way - make it a Reliance



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A complete unit—rapidly set up, inexpensive to operate, insuring large capacity, very little vibration. Crushing, elevating, washing, screening done on spot, materials stored in Reliance Steel or Wood Bins (completely fabricated, easy to erect). Experienced contractors put these Reliance Units together quick to meet any job capacity — at a profit. You, too, will do well to investigate.

PORTABLE with V-BELT DRIVE

Whether you use this Reliance Portable Crusher alone or in combination with an Elevator, Chute Screen, etc., you can get no better value for your money in terms of capacity, low operating cost and rugged durability. The Reliance Crusher is famous for its strength and simplicity. It is particularly stable. A "swell" buy for crushing on any job. Send for detailed circular.

PRODUCTS:

Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY COMPANY
KINGSTON, N. Y., U. S. A.

DISTRIBUTORS in ALL PRINCIPAL CITIES of U. S. A.

(Continued from page 119)

these conditions have been improved by lowering the road surface or by narrowing or setting back abutments. However, by routing vehicles carrying exceptional loads, with due regard to their overall dimensions, traffic has always succeeded in reaching its destination.

To sum up: It has been found that roads which are capable of carrying normal industrial traffic are reasonably immune from damage by military vehicles, save in special circumstances such as those previously described. Apart from tanks such damage as has occurred in Britain has been due in the main to great increase in the weight or volume of traffic on third-class roads in rural areas.

★ ★ ★

Three Tunnels Driven by Full-Face Drilling With Detachable Bits

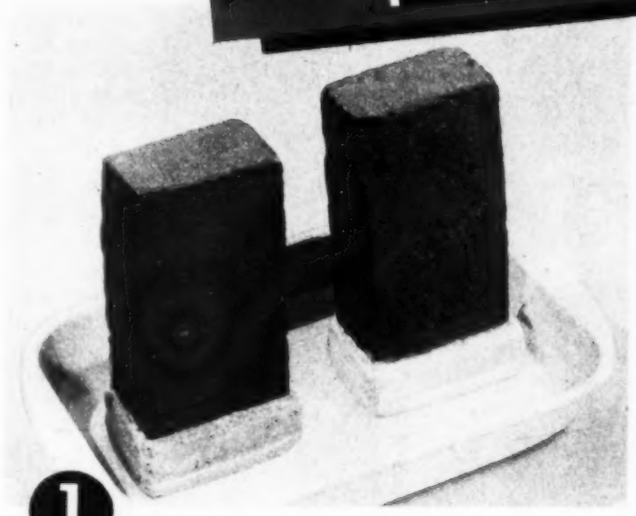
(Continued from page 52)

was carried on. The camp consisted of a general office and warehouse building, a general store, a restaurant and recreation hall building, 14 two-room apartments, a trailer camp location, a camp laundry and shower-bath building, and a playground for children. A power plant consisting of two 187-kva., 3-phase, 60-cycle generators driven by two 225-hp., direct-connected Fairbanks-Morse diesel engines, supplied power and lights for the camp and also for driving tunnel No. 2. Water was pumped from a well on the South Canadian River, a distance of 8,000 ft., to a 22,000-gal. storage tank located on the mesa above the camp. A sanitary sewer served the camp, sewage being disposed of through two covered and interconnected sewage-disposal pits located approximately 1,000 ft. below the camp.

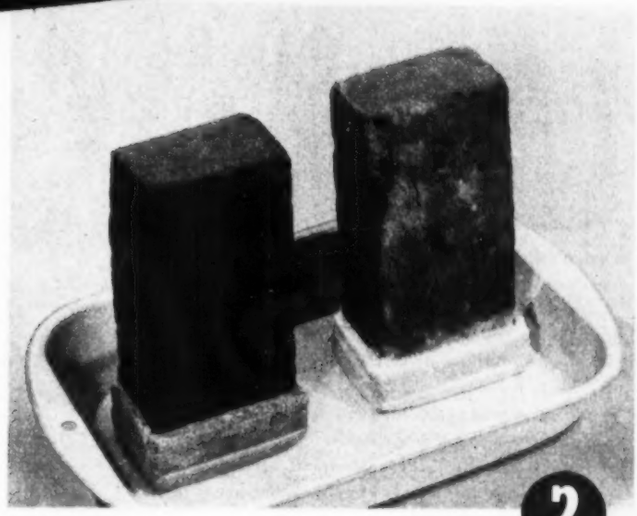
The area is an uneven plain from which mesas rise up to 500 ft. These mesas are the result of cloudbursts which have eroded all the areas not capped by hard formations, and consist chiefly of horizontal beds of shale and sandstone, the predominating formation being horizontal beds of red shale in varying degrees of hardness and in every case capped with a layer of harder sandstone. It is

(Continued on page 122)

MAKE THIS TEST — Prove BRIXMENT is BEST!



1 "Cap" one brick with Brixment mortar (left), and one brick with mortar made with 50-50 cement and lime. After mortars have hardened, place both brick in a pan of shallow water. (Photo 1.)



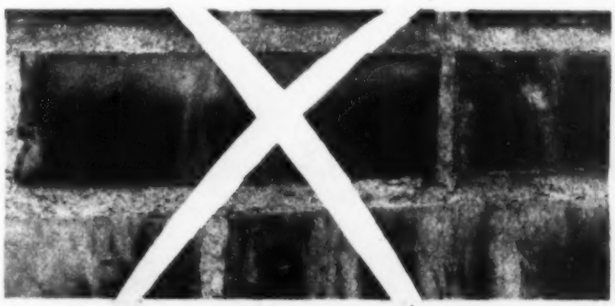
2 Keep about an inch of water in the pan. Even if soluble salts are present in the brick or sand, you will soon be convinced that *Brixment mortar helps prevent efflorescence.* (Photo 2.)

BRIXMENT *Helps Prevent* EFFLORESCENCE!

EFFLORESCENCE is an outcropping of minute white crystals on brickwork. When these crystals occur on colored mortar joints, the condition is sometimes mistaken for *fading.*

Efflorescence is caused by the presence of soluble salts in masonry materials. When reached by water, these salts dissolve, and are drawn by evaporation to the surface of the wall.

Brixment itself *does not cause efflorescence* because it is practically free from soluble salts. Even when such salts are present in the sand or brick, the waterproofing in Brixment mortar usually *prevents them from coming to the surface.* . . . Bricklayers who have used Brixment mortar for years say they have far less efflorescence with Brixment mortar than with *any other kind.*



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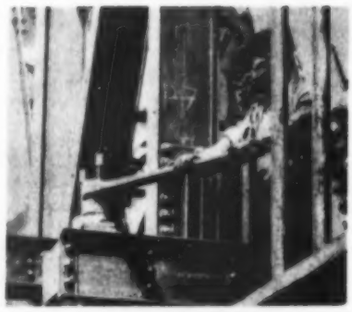
For Mortar and Stucco

Louisville Cement Company, Incorporated, Louisville, Kentucky. Cement Manufacturers for Over a Century.

Bridge Constructors Depend Upon



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For running up nuts on anchor bolts and connections, bridgemen need wrenches that will work fast and SAFELY.

The LOWELL "Steel Socket" Bridge Builders' Wrenches—with their positive guarantee that handles will not break—meet the tough requirements of big bridge jobs.

Built in a wide range of types and sizes to cover many needs of the engineering-construction field.

Have patience with your dealer if he is unable to furnish all of the numerous LOWELL types and sizes, because we are engaged, for the duration in supplying the needs of our Armed Forces.

See how each pawl, when engaged, transmits leverage from the solid stock of the handle, direct to the gear, in a straight line and with a square contact. The pawl is in compression only—no shear, no tension, no torsion. The shipper carries none of the load. This strong construction insures steady service.

LOWELL WRENCH CO.

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● Nearly 50 years ago Hetherington & Berner built the first asphalt mixing plant to be constructed in America. From that day to this we have specialized in the design and production of asphalt plants—continually working to improve their efficiency. H & B asphalt plants of today—both stationary and portable—incorporate the latest developments in design which have been proved in performance. Specifications conform to the most rigid state and city requirements, both as to engineering design and safety regulations. Write for bulletin CM-260.

HETHERINGTON & BERNER Inc., Indianapolis, Indiana

● H & B Bituminous Mixing Tower (Stationary Type). Built in mixer sizes of 2,000, 3,000, 4,000 and 7,000 lbs.

H&B

Hetherington & Berner

(Continued from page 120)

through these mesas that the tunnels were driven.

In addition to the tunnels, the contract also included 2,260 ft. of canal excavation adjacent to the inlet and outlet portals. Of interest in the open-cut excavation was the attempt to prevent excessive erosion from water falling on the slopes above the portals by leaving berms of varying widths at 20-ft. intervals in elevation. Drainage ditches, collecting and diverting the water to points beyond the cut, were dug in the berms.

Drilling

Time allowed for boring the tunnels necessitated working two headings simultaneously. Tunnel No. 1, having the shortest completion time, was started first. A power plant similar to the one at tunnel No. 2 was erected at the inlet end to furnish electric power for driving and lighting. A superintendent was in charge of each tunnel and similar methods were employed on all three sections. Differences in results arose principally from difference in ground conditions.

In all three tunnels the full face was drilled at one setup. In tunnel No. 1 a standard design of track-mounted jumbo was used, while in tunnel No. 2 the drilling platform was built on the mucking machine. The latter type, Mr. Robinson points out, had its disadvantage, in that the platform area was inadequate, both for drilling and timbering. It had its advantage, however, in that no time was lost between the various boring cycles, as the mucking machine was immediately converted into a drilling jumbo upon completion of the mucking operation. Both jumbos carried all the posts and bars necessary for the mounting in any desired position of 4 Ingersoll-Rand automatic DA-30 drifters. Air was supplied from the powerhouse through a 4-in. OD pipe line laid along the side of the tunnel and connected with Dresser couplings. Water for drilling was supplied from the Conchas Dam town site waterworks system for tunnel No. 1, and from the contractor's waterworks system for tunnels Nos. 2 and 3. It was piped into the tunnels through a 2-in. pipe line and was kept at 80-lb. pressure at the face with a Gardner-Denver air-booster pump located near the heading.

One-in. hexagonal drill steel with detachable bits was used. After each drill-out the steel was taken to the shop, where it was examined for plugged steel; and worn detachable bits were replaced. The number of holes drilled per round and length of the round depended on the ground, but the usual round consisted of 40

(Continued on page 124)

Typical water sludge deposits

Learn to read their warning signs ... save hard-to-get parts

• EXCESSIVE WEAR on valves, pistons, rings, and other internal engine parts is almost always preceded by signs of mechanical trouble or motor oil failure indicated by various types of engine deposits. These signs are not always easy to read – particularly where deposits are caused by a combination of oil and mechanical failures. But time spent analyzing them is well worth while.

Some common types of deposits and probable causes are outlined at the right. When the mechanical causes for these deposits have been eliminated, Standard has two detergent-type, oxidation-resistant oils that will minimize your engine deposit trouble.

Heat-Proofed Stanolube H. D. Developed especially for gasoline and Diesel engines in heavy-duty service where the maximum in oxidation stability is needed to combat high temperature operation ... it eliminates varnish and other deposits caused by oil oxidation. It is also highly detergent, which prevents blow-by carbon and other foreign contaminants in the oil from settling out and clogging oil lines, screens, and filters. This oil is available only to the U. S. Government and fleet operators.

Standard Bus and Truck Oil. This oil combines high oxidation stability and detergency, not found in conventional motor oils, to give exceptionally clean engine operation for practically all normal fleet demands.

Which oil do you need? With one of these oils, you can definitely reduce to a minimum your maintenance time and replacements now caused by engine deposits. Arrange for a trial of either or both. Call the local Standard Oil Company (Indiana) office, or write 910 S. Michigan Ave., Chicago, Ill. In Nebraska, call any local Standard Oil Company of Nebraska office.

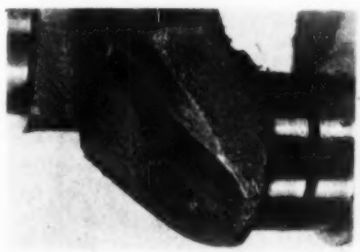
Oil is ammunition ... Use it wisely

Common types of engine deposits and probable causes:

Varnish deposits (lacquer-like): a hard, lustrous coating. Forms on many engine parts and is plainly visible on pistons, valves, and bearings. When crankcases are ventilated into the air intake system, deposits from this source may cause carburetion or valve trouble, often mistaken for gasoline gum troubles. Causes: high operating temperatures with low oil consumption, or infrequent drain periods, or poor oil stability against oxidation.

Oxidized oil sludge: a dark, sticky material of a tarry nature. Forms on oil screens, filters, crankcases, etc. Causes: high crankcase temperatures, poor oil oxidation stability, or the extension of drain periods beyond the stability of the oil being used.

Water sludge: a mixture resembling mayonnaise dressing in consistency. Forms in the crankcase and is found in practically all parts of the engine. Causes: excessive water in the oil from leaks in the cooling system, condensation of moisture in the crankcase when temperatures vary widely, or water generated in the cylinders – a product of combustion when gasoline is burned – which may blow by pistons. This deposit or emulsion will form even with the best oils, particularly if dust and other contaminants are present.



Granular carbonaceous deposits: a coating having the general appearance of coffee grounds. Causes: the hardening of oil oxidation products, originally dissolved in the used oil, but later precipitated. The deposit forms more rapidly when there is no detergent agent present to keep the oxidation materials dispersed throughout the oil.

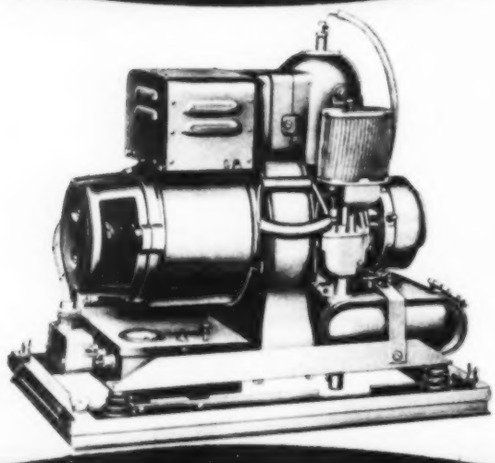
Carbon deposits: vary in type and amount with the type of fuel or motor oil used and the mechanical condition of the engine.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ **FLEET CONSERVATION SERVICE**

For Getting the Job Done Faster

HOMELITE



Portable Generators

The old Homelite story now has a new twist. Homelite Portable Generators have had plenty of experience in helping to speed emergency repairs . . . and, for that matter, they're still doing it.

But the big job now is to meet the greatest emergency of all time . . . *the war.* Therefore, all new Homelite Generators must go to the Armed Forces . . . to help our Air Force, Tank and Signal Corps do their jobs better and faster.

To meet the requirements of our fighting forces, many improvements have been added to Homelite Portable Generators. Our new models are more powerful, more rugged, and more able to operate under all conditions than ever before. And because of this they'll be far more valuable to you who will get them after the war.

The quality of Homelite Portable Generators — now produced in huge quantities — has earned the high Army-Navy production award. After the war, we'll produce as well for you.

HOMELITE CORPORATION

PORT CHESTER, NEW YORK

(Continued from page 122)

holes, loaded with 150 of 45-percent powder, pulling 10 ft. of ground and producing 60 cu. yd. of muck. In each of the tunnels some bad ground was encountered which required use of crown bars, and near the outlet of tunnel No. 2 the tunnel was driven through what apparently was an old streambed. For 275 ft. the sand came in from the sides, crown, and face, and it was necessary to place the tunnel steel supports 12 in. apart and drive spiling ahead, as well as breast-board the face.

Mucking

The mucking was done with Type 60 Conway muckers. Side-dump cars of 4-cu.yd. capacity, pulled by 8-ton Atlas electric tunnel locomotives powered by Exide batteries were used to transport the muck. Fifty-six-pound rails were used in the tunnel, and the track was kept in good shape, permitting fast-time runs out of the long tunnels, which were all bored from only one end. A passing track, cherry picker, and a stub spur were all tried and used in mucking-out — the passing track proving the most satisfactory in switching cars at the heading.

Timbering was required in all the tunnels with the exception of two short sections in tunnel No. 1 where sufficiently hard sandstone was encountered and the timbering eliminated. Timbering was carried on immediately after mucking out by the heading crew, using 5-in. structural-steel supports with native lumber for lagging, bracing, and foot blocks.

Placement of the concrete lining through pipe line bed by Prestweld placer followed immediately upon completion of excavation. Aggregate for the concrete was prepared under a separate contract, and was processed at aggregate area No. 1, located on the South Canadian River 3 mi. northeast of Conchas Dam, and aggregate area No. 2, also located on the South Canadian River, and 2 mi. northeast of the outlet of tunnel No. 3. It is estimated that approximately 100,000 tons of aggregate and 75,000 bbl. of cement were required in the tunnel lining and appurtenant structures.

Engineering

The engineering was under general supervision of the Tucumcari office of the U. S. Bureau of Reclamation; H. W. Mutch, resident engineer. The Conchas Division is under the direction of H. E. Robinson, associate engineer, with C. H. Rader, assistant engineer, in charge of tunnels. Engineers were on the job continuously giving line and grade and checking the placement of lagging. An instrumentman only was required on

(Continued on page 126)

ON MOST VITAL CONSTRUCTION JOBS
Galion motor graders and rollers have been or are being used on most war-construction projects in all parts of the world. Roads to be built and repaired . . air fields and bases to be constructed and maintained . . shell holes to be filled . . all vital to victory. It takes rugged and dependable equipment . . the kind that Galion builds. You'll find it on active service with the Air Force — Coast Guard — Engineers — Marines — Navy and the "Seabees"
GALION
GALION ROAD MACHINERY

THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

MORE PENETRATION *per* MINUTE

SUPER-VULCAN

OPEN TYPE
Differential Acting
PILE HAMMERS
18C-30C-50C and 80C

● As the piles go down get them there in quickest time with least effort and with savings in cost. Twice the blows per minute does the job. Each blow takes but one quarter to one third the steam. Things to consider are the rugged strength, positive action, and compactness. The open type fits the same leads and uses the same accessories as the VULCAN single-acting Pile Hammers.

Sizes
18C—30C—50C—80C
meet all needs

WRITE FOR BULLETINS

VULCAN IRON WORKS Since 1852
331 North Bell Avenue
Chicago Illinois

(Continued from page 124)

"swing" and "graveyard" shifts, while a 4-man party was used on day shifts, setting permanent line and grade points, in addition to the heading points.

Permanent line and grade points were carried through the tunnels by means of brass caps set in concrete blocks located on the center line and below invert grade. Working points for daily use were carried in the crown, and consisted of tubular electric lamps. These proved satisfactory, and were especially useful when the tunnel was smoky or foggy.

★ ★ ★

Naval Supply Depot Makes Outstanding Progress

(Continued from page 58)

ect. All the storehouses have standard plan dimensions of 200x600 ft., but the three types vary in height, structural design and mechanical installations. The largest group is made up of 39 general storehouses, each of which is divided by three transverse brick firewalls into four equal units, with two roof monitors over each unit.

Longitudinal monitors over a wide-span center craneway bay distinguish the 16 other storehouses. Of these structures, eleven are heavy materials storehouses, two of which are combined side by side to form a diesel storage building. Timber trusses are used for framing the craneway aisle in the heavy materials storehouses, but the side bays are framed with timber girders. The remaining five structures, for aeronautical storage, resemble the heavy materials storehouses in outward appearance, but they employ timber trusses for framing the side bays as well as the craneway bay.

In the general storehouses, columns are spaced 20 ft., c. to c. The heavy materials storehouses and the aeronautical storehouses have a central craneway bay of 66-ft. span flanked by two 33½-ft. bays at each side. Columns are spaced transversely in accordance with the spans of these bays. In the longitudinal direction, the heavy materials storehouses have columns on 20-ft. spacing to support girders over the 33½-ft. side spans and trusses over the 66-ft. craneway

(Continued on page 128)

CMC
A GREAT WARTIME RECORD

On the front lines of war-time construction all over the world, CMC equipment has been getting the jobs done. Yes, CMC Mixers, Pumps, Hoists, saws, Carts and Barrows have joined the Army, Navy and Marines, and will be remembered for their ability to STAND UP AND TAKE IT under the punishing service of the greatest construction program in the history of mankind.

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA

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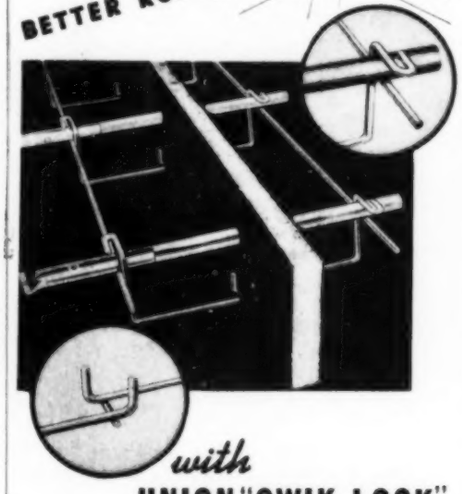
SAWS • CARTS • BARROWS

Takes Less Time

TO BUILD BETTER RUNWAYS



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Union "Qwik-Lock" Airplane Runway Expansion Joint Assemblies speed up construction. They simplify installation of dowels and joint material and accurate, locking and alignment of dowels. They are designed for fool-proof, trouble-free functioning.

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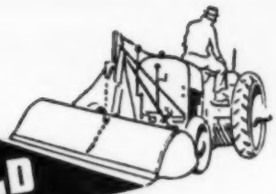

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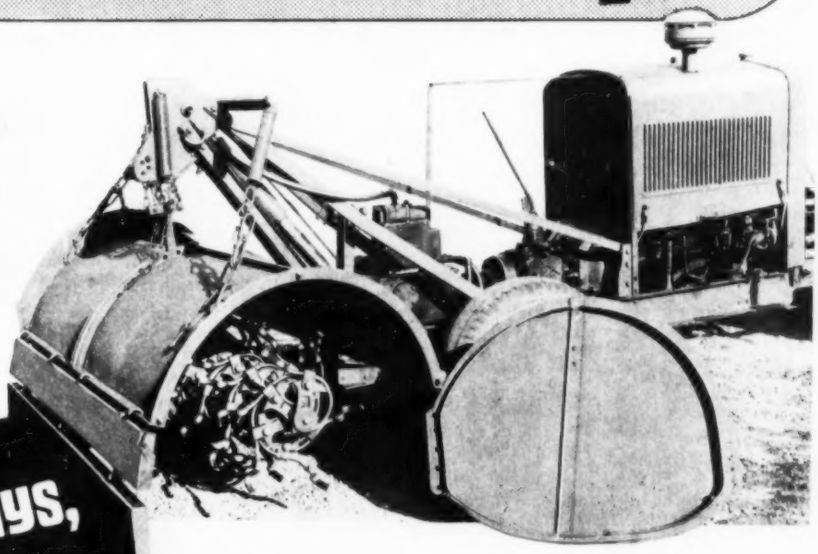

FOR BUILDING HIGHWAYS, RUNWAYS, FLIGHT STRIPS *faster, better!*

BACK in the 30's this original "3-in-1" Rotary Action Tillage Machine was used on early experimental projects in soil-cement construction.

The landing fields and roads built then are still in use, in sound condition. They've taken the extremes of weather, the abuse of traffic. And each year since then ROTOTILLER Roadmaker has kept pace with developments in soil-cement and soil stabilization work by constant improvement in machine and method.

ROTOTILLER Roadmaker is engineered to exacting automotive standards. It is sturdy, powerful—ruggedly built to meet today's exacting war-time demands.

Contractors and engineers engaged in military construction are urged to get all the facts on this improved 1943 job-tested ROTOTILLER Roadmaker. Write for literature.

Post war plans undoubtedly will call for thousands of miles of soil-cement and soil stabilized secondary roads. Returning soldiers will find economic security in this work. Then, as now, ROTOTILLER Roadmaker will serve faithfully and well.

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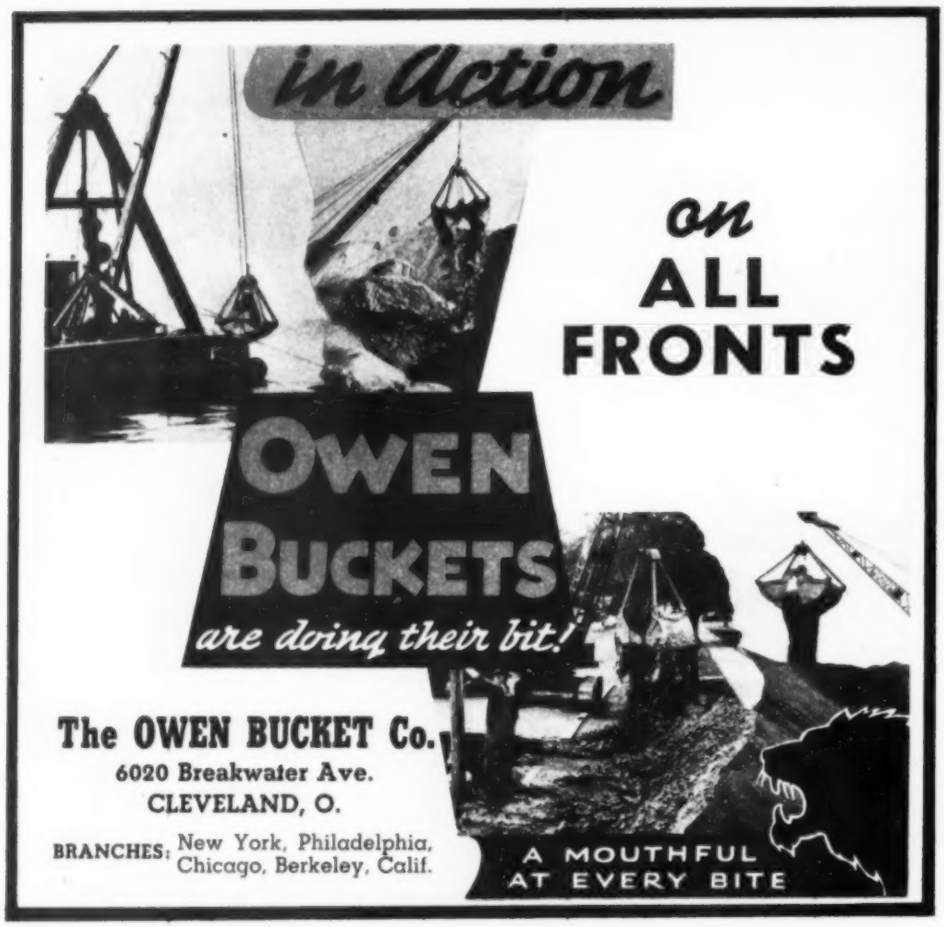

EVERY DRAGLINE OPERATOR SHOULD HAVE THIS BULLETIN

It illustrates in detail how the DRAGLINER is (1) Scientifically designed for great strength and durability. (2) The round smooth front end cutting digging resistance. (3) The Manganese Steel combination hitch plates and bumpers to take the shock and protect the arch and drag hitches. THE DRAGLINER CANNOT BE DROPPED ON THE ARCH. (4) Trouble-free lips and teeth as well as a number of features not found in any other design, all of which contribute to increased yardages of hard-to-dig materials.

Designed and Sold by
DANIELS-MURTAUGH CO., Cedar Rapids, Ia.

Built by
UNIVERSAL ENGINEERING CORP.

(Continued from page 128)

span. In the aeronautical storehouses every second row of interior columns is omitted to provide 40-ft. clear spans in the longitudinal direction, and intermediate trusses at 20-ft. spacing over the side bays and central bay are framed into longitudinal trusses supported at 40-ft. intervals by the columns. The main longitudinal trusses at the two sides of the central monitor bay also support the craneway girders.

Exterior walls of 40 of the storehouses have brick spandrels above the concrete foundation walls and below the sills of the steel sash; spandrels of the other 15 storehouses are concrete.

Of the 39 general storehouses 26 are heated to prevent damage to materials caused either by low temperatures or by temperature fluctuations. Each heated storehouse is equipped with two coal-fired warm-air heating systems.

Frames, Walls and Roofs

Timber for the structural frames of the buildings was fabricated in the Portland, Ore., mill of Timber Structures, Inc., and was shipped across the continent by rail in an average time of 10 days. The timber members arrived on the site marked for assembly and erection. Joints were made with timber connectors.

Quantities of timber and of various types of connectors required for the structural frame of each of the three classes of storehouses are listed in an accompanying table, which also gives the quantities of sheathing, sash and siding. Erection speed is indicated by the fact that the complete timber frame for a general storehouse, containing 347,000 b.ft. of lumber, was put up in an average of three 10-hr. days with a crew of about 28 men and one or two cranes, as available, after the timber had been distributed and partially assembled on the ground inside the building area. The structural frame for the first of five aeronautical storehouses, requiring, with the craneway girders, some 715,000 b.ft. of lumber, was erected complete by a crew of about the same size in ten 10-hr. days after all the trusses had been assembled.

Except for the large wall area inclosed by glazed sash, exterior walls of the buildings are sheathed with 1x6-in. dressed and matched t. & g. lumber, covered by 3/16-in. Keasbey & Mattison asbestos-cement sheets. The asbestos-cement siding was attached to the sheathing with No. 10 electrò-galvanized wood screws 1¼-in. long driven tight against 5/8-in.-diam. lead washers 3/16 in. thick. Butt joints between asbestos-cement

(Continued on page 130)

WANTED: More Wire Rope
FOR ESSENTIAL WAR WORK

Every Wire Rope User Can Help

YOUR wire rope is production equipment . . . a moving part subject to the same factors of wear and tear as that of any other operating machinery.

The selection of the correct grade, size and type of wire rope . . . proper installation and equipment . . . consistent maintenance procedures—all will contribute to longer life thereby releasing more wire rope for the immediate Victory Cause . . . a patriotic and profitable measure every wire rope user can employ.

May we send you a copy of "Practical Information on the Use and Care of Wire Rope"?—no obligation.

The day after day performance record of "HERCULES" (Red-Strand) Wire Rope is demonstrating that it has what it takes to meet 1943 conditions. In "HERCULES" there is a "right" rope for every heavy duty purpose, as it is furnished in both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type.

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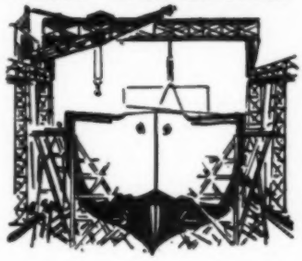

CONSTRUCTION

MINING

WAR MACHINES

SHIPPING

MADE ONLY BY

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. . . WHEN THE PAYOFF COMES

"Sick-Absenteeism" takes its toll!

Summer colds and other nuisance illnesses can take a terrific toll . . . days away from work, jobs suffering from further cuts in manpower. Payday produces half-filled or empty time cards. Today, when every minute counts, extra precaution should be vigilantly exercised to protect the men at their vital work on construction projects. Stop a cold before it spreads!

Keep Your Men on the Job!

One of the most flagrant offenders in spreading colds and other contagion is the old-fashioned water bucket. It has no place in the work you are doing to win the war. Common sense dictates the modern, safe way to water your men. Give them the protection of a Dixie Portable Water Tank. . . . It takes a drink to the men, where they are working, in individual paper cups. Equip your modern water boy with Dixie or Vortex Cups and keep your men on the job.

If you are not using this easy, quick and healthful method to water your men, write to the Dixie Cup Company for picture folder and complete details. Offices in Easton, Pa., Chicago, Ill., Toronto, Can.

DIXIE CUPS

ONE OF THE VITAL HEALTH DEFENSES OF AMERICA-AT-WAR

(Continued from page 128)

sheets were sealed by calking with hand guns, except on the general storehouses, where they were covered with 2-in.-wide asbestos-cement battens. About 20,000 gross of screws were needed to fasten more than 2,500,000 sq.ft. of asbestos-cement siding applied to the buildings. Ordinary wire nails for secondary framing and sheathing amounted to a total of about 35,000 kegs; a carload of 400 kegs lasted one week.

Roof decks are sheathed with 2x8-in. t. & g. lumber covered by three-ply built-up roofing consisting of two plies of 30-lb. felt and a top ply of 15-lb. felt, with a slag topping. The felt plies and the topping were laid on hot moppings of asphalt. To cover 168 acres of roof, the job consumed about 250,000 rolls of impregnated felt, 3,800 tons of roofing asphalt and 6,900 tons of slag.

Concrete Supply

Concrete requirements running up to 2,000 yd. in 10 hr. had to be distributed to as many as 37 different locations in one day on the 800-acre site. The distribution problem was met by mixing and delivering the concrete with a fleet of 3- and 4-yd. truck-mixers (principally Rex and Jaeger machines with an occasional Smith unit). On heavy days the fleet comprised 37 to 40 truck-mixers, which were charged at two aggregate and two cement batching plants.

Supplemental illustrated articles will give additional information on certain features of the project: (1) grading and utilities; (2) concrete floor construction, and (3) timber framing. These articles will appear in forthcoming issues of *Construction Methods*.

Direction

Planning, design and construction of the naval supply depot have been carried out for the Navy Department by the Bureau of Yards and Docks, of which Rear Adm. Ben Moreell is chief. All operations at the site have been under the immediate supervision of Lt. Comdr. H. V. Martin (CEC) USN, officer in charge of construction. V. H. Gravell and J. W. Minick are the architect-engineers. Verne L. Ketchum is chief engineer of Timber Structures, Inc., which designed and supplied the timber for frames.

Brann & Stuart, contractors, built the naval supply depot for the Bureau of Yards and Docks, with the following men in charge: H. B. Madden, project manager; William E. Kliefoth, general superintendent of buildings; and Charles P. Hartline, general superintendent of grading and utilities.

As more materials are diverted to essential war uses, new equipment becomes more difficult to get. Greater care must be given present equipment until after Victory. Let your Gorman-Rupp distributor restore your equipment to its original operating efficiency. They carry parts and repairs for all equipment they sell. Their charges will be reasonable.

Gorman-Rupp Self-Priming Centrifugal Pumps are available for immediate delivery through Gorman-Rupp Distributors.

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BOMBS AND SHELLS
ARE BEING MADE
FROM
CONCRETE PIPE!
Welded Ring Reinforcement, efficiently designed for concrete sewer and culvert pipe, has saved many tons of vital steel for armaments.
Complete Reinforcement units, pre-assembled of fixed diameter welded rings, satisfy required reinforcement areas exactly without waste of steel or manpower.
Shop fabricated spacers hold the individual rings at any desired spacing. Rings may be any diameter.
Specify Welded Ring Reinforcement.
LACLEDE
Write for complete data on Welded Pipe Reinforcement.

LACLEDE STEEL COMPANY
ST. LOUIS, MISSOURI

All-Welded Main Boosts Water Delivery To War-Expanded Industrial Area

(Continued from page 75)

and two seams in the remainder. Flying westward, the searching party acquired 18,000 lin.ft. of 26-in. O.D. butt-welded pipe, ¼-in. wall thickness, about 75 percent single-seam and 25 percent double-seam, from yards at East St. Louis, Ill., and Houston, Tex. Though second-hand, this pipe likewise never had been used. Some 24-in. O.D. tubing was refused because it could not be converted economically into large-dimension pipe possessing the desired hydraulic characteristics.

By ingenious development of special plate-straightening apparatus, the Walsh Holyoke Steam Boiler Works unrolls the small pipe, rerolls it to semicylindrical shape of twice its original radius, and welds two half cylinders together to form a section of large pipe. Last month's article illustrated these operations, step by step. Old 30-in. O.D. pipe is refabricated to 58⅞-in. I.D. and 26-in. O.D. to 51⅜-in. I.D. The resulting 4,000 ft. of ⅜-in. wall pipe and 9,000 ft. of ¼-in. wall pipe are distributed in portions of the line where hydrostatic pressures best fit the strength of the conduit. Maximum working pressure are about 40 psi. less than specified test pressures of 169 psi. for ⅜-in. wall, 58⅞-in. I.D. pipe and 129 psi. for ¼-in. wall, 51⅜-in. I.D. pipe. Because all pressure testing apparatus in the shop is specially arranged at present for constant use on tests of war products, testing of pipe is delayed until sections of the line have been completed by welding of circumferential joints in the field.

Effect of Supplemental Main

Delivery capacity of the present 42-in. steel main is 22 mgd. Hydrostatic head available for the delivery of water from the filters to the covered reservoir is about 40 ft. Loss of head caused by friction in the 42-in. existing pipe is close to 1 ft. per 1,000 ft. of line, or 13 ft. in the 13,000 ft. now being supplemented by

(Continued on page 132)

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Ask the Men Who Handle 'Em!

"We're pals — me and my Mercer Crane! Just show us the work...we'll clean it up in jig time. My No. 7's a real sweetheart — it's just about the smoothest tonnage tackler on wheels!"

Live Boom, Telescoping Gooseneck Boom Head with Boom Rollers.

Standard Live Boom equipped with double sheaves for main and topping hoist lines.

A Single Hoisting Line that goes over the top—designed especially for Stevedores.

"Mercer—that's MY Crane! It picks 'em up and puts 'em down just like it was no effort at all! You'll go a long way, Buddy, before you'll find a Mercer Crane that can't take it!"

3, 5 and 7 Ton Capacities!

Compact, fast, sturdy...they deliver hard, continuous service at low cost. Gasoline-powered . . . one-man operation. Single or double-drum hoists. Cushion rubber or pneumatic tires. Special booms and heads for every type of lifting, carrying and loading. Parts standardization means simple adjustment and servicing in the field. Our new Catalog No. 65 completely illustrates and describes the entire line. Write for your copy today.

To assist Mercer Crane Operators and help conserve equipment, we offer a group of "Maximum Load Finders" covering all models. These jumper-pocket size "rules", shown at the left, tell the operator at a glance exactly the maximum load he can safely carry at various distances in front of the bumper plate. These handy gadgets are yours for the asking!

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Materials Handling Equipment

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WORKS: Clifton (Allwood), N. J.

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While You Wait

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9"	10"	11¼"	12"	13½"	Inside Diam
64	78.54	100	113.1	144	Sq. Inches

A heavy laminated fibre tube that can be hand-sawed to length on the job. Practical up to 10' — shipped two lengths to car — up to 24 ft. each. . . Easy to handle — requires minimum bracing. . . Easily stripped or allowed to slough off.

Immediate Delivery

Widely used and Approved for Cantonments and other Government Construction — U. S. Army Engineers; U. S. Navy Department Yards and Docks; P. B. A. and F. H. A.

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SONOCO PRODUCTS COMPANY
HARTSVILLE, S. C. MYSTIC, CONN.
ROCKINGHAM, N. C. BARWOOD, N. J. LOWELL, MASS.

(Continued from page 131)

the auxiliary main. After the second pipe has been added for water delivery through the dual line, the friction loss will be reduced to 3 ft. in the 13,000 ft., leaving 37 ft. of head to accelerate flow through the remainder of the system. In comparison with the present head of 27 ft. available at this point, the new head will represent an improvement of more than 35 percent, adequate to increase the carrying capacity of the system to about 29 mgd. This flow, in conjunction with a reserve capacity of 29,000,000 gal. in the covered reservoir, will take care of any expected peaks.

Trench Excavation

To provide minimum cover of 4 ft. specified for the new main, trench must be excavated about 9 ft. deep to accommodate the 59-in. and 51-in. pipe. Especially during the spring weather, trench side slopes cannot stand safely on gradients steeper than 1 on 1. With these allowances, excavation of the trench amounts to about 70,000 cu.yd. Mica schist ledge rock is encountered in the bottom of portion of the trench, and rock excavation is expected to total about 2,000 cu.yd. Some of the softer rock can be broken out with pneumatic paving breakers.

Accompanying photographs show methods and equipment employed by the contractor for trench excavation. In ledge rock, blast holes are drilled on 3- or 4-ft. spacing, depending on the hardness of the mica schist. Most of the dynamite used is 60 percent gelatin, which has proved better than 40 percent for the rock blasting. Little more than 1 lb. of the explosives used, about half duPont and half Hercules, is required per cubic yard of rock broken.

Stream Crossings

Only one stream crossing of large size, at Munn Brook, calls for special procedure. To put the main across this stream, the contractor cofferdammed the brook, sheetpiled a channel entirely in the bank for the flow, using the cofferdam as one side of the diversion channel, and placed a concrete collar and wall over the outboard end of the pipe laid in the first cofferdam. In the two vertical edges of this concrete barrier, steel sheetpiles were embedded to start the sheetpiling later for the trench going forward from the brook. Steel sheetpiles weighing 23 lb. per sq.ft. are driven in 30-ft. lengths to assure sufficient penetration to prevent boiling inside the sheeting in a bottom of undetermined character. The piling is

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CONSTRUCTION TOOLS

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DROP FORGED CONSTRUCTION RATCHETS

The ARMSTRONG Reversible Ratchet Construction Wrenches are made of steel thruout—the Ratchets are drop forged, the Nut Socket machined from special analysis bar steel. All parts except the handle are hardened. The spindle of the Ratchet is of "wide open" design—permits bolt to pass thru the Ratchet so that nuts can be run any distance along bolt and securely set with one setting. 24" or 36" Ratchets take square or hexagonal sockets for nuts of from 1" to $2\frac{5}{16}$" dia. or 1⅛" to 3⅛" dia., respectively.

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set and driven by a Bucyrus-Erie 41B steam crane with a 70-ft. boom. For a good run of driving at reasonable boom radius, the crane punches down the sheeting with a McKiernan-Terry 9B3 double-acting 7,000-lb. steam hammer. When boomed out to greater radius, the crane operates a lighter No. 7 hammer. Hammers are hung on the load line of the crane and are fitted with guide plates to maintain a seat on the sheeting.

Pipe Delivery

Straight sections of pipe are uniformly 30 ft. long (within a fraction of an inch) and weigh about 2.1 tons for the 51x¼-in. tubing and 3.8 tons for the 59x⅜-in. conduit. All angle bends are fabricated at the boiler works to eliminate any angle fitting in the field. Some angle sections exceed 30 ft. in length and weigh up to 4½ or 4¾ tons. A truck-trailer hauls two pipe sections at a time from the fabricating yard to the job, an average one-way distance of 12 mi., requiring about 2 hr. for a round trip.

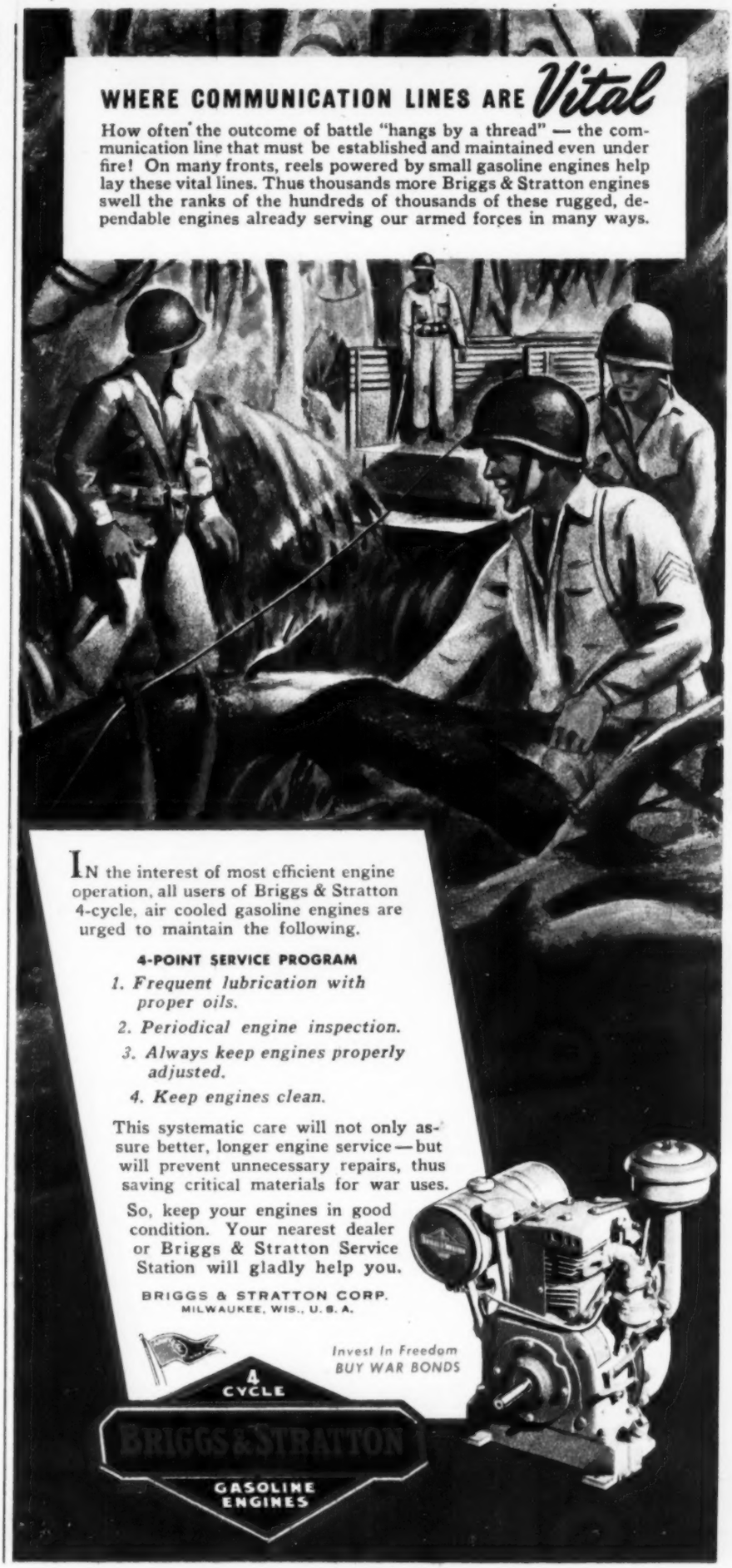
At the job, a crane-converted P&H excavator of ¾-yd. capacity, mounted on a Mack truck and equipped with a 50-ft. boom, unloads the pipe from the hauling unit to the ground. To move the pipe by tractor power along the line from the unloading point, the contractor's field crew made a sled out of two wood piles with cradle bolsters cushioned by pieces of old fire hose.

Fitting Up in Trench

Pipe ends are fabricated with half-circle butt straps to reinforce the joints and to permit joining two adjacent sections with three circumferential welds, two outside and one inside. All joints are fitted up and welded in the trench. Laying of pipe is facilitated by placing an upper-half butt strap of one section on top of a lower-half butt strap of a section already laid. Because it is impossible to fabricate and deliver perfectly circular welded steel pipe on any job, special skill is required in fitting up the connections between adjacent sections. Pipe sections which are out of round are brought into matching contact at the joints by use of small hydraulic jacks.

The pipe is placed to position in the trench, the first pipe being nearly at the grade at which it is to rest. To this section is added the second pipe, which is forced into position, jacks being used from the side of the trench or from the inside of the pipe to adjust the pipe to circular shape

(Continued on page 134)


WHERE COMMUNICATION LINES ARE Vital
How often the outcome of battle "hangs by a thread" — the communication line that must be established and maintained even under fire! On many fronts, reels powered by small gasoline engines help lay these vital lines. Thus thousands more Briggs & Stratton engines swell the ranks of the hundreds of thousands of these rugged, dependable engines already serving our armed forces in many ways.
IN the interest of most efficient engine operation, all users of Briggs & Stratton 4-cycle, air cooled gasoline engines are urged to maintain the following.
4-POINT SERVICE PROGRAM
1. Frequent lubrication with proper oils.
2. Periodical engine inspection.
3. Always keep engines properly adjusted.
4. Keep engines clean.
This systematic care will not only assure better, longer engine service — but will prevent unnecessary repairs, thus saving critical materials for war uses.
So, keep your engines in good condition. Your nearest dealer or Briggs & Stratton Service Station will gladly help you.
BRIGGS & STRATTON CORP.
MILWAUKEE, WIS., U. S. A.
Invest In Freedom
BUY WAR BONDS
4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

They Had to be Made to *Take it!*

Few jobs have involved *rougher going* for equipment of all kinds than the building of the Alcan Highway. Air hose couplings were no exception . . . the demand for speed precluded ordinary careful handling. Under such conditions, the use of couplings known for their efficient design and rugged construction was a *must*.

"GJ-BOSS"

GROUND JOINT

AIR HAMMER COUPLINGS

Compact Type, Style XLB-61, ½" and ¾"

Heavy Type, Style XHB-72, ¾" and 1"

Strong, durable, safe. Soft-to-hard metal seal provided by ground joint, *washerless* design, remains *leakproof*, regardless of wear or presence of abrasive particles. Husky "BOSS" Interlocking Clamp eliminates all risk of blow-offs. Swivel wing nut facilitates connecting and disconnecting. **NOTE** — For washer type couplings of otherwise identical design, specify "BOSS" Air Hammer Couplings — Compact Type Style WLB-21, ½" and ¾"; Heavy Type Style WHB-32, ¾" and 1".

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VALVE & COUPLING CO.
MAIN OFFICE AND FACTORY: PHILADELPHIA
BRANCHES: CHICAGO · BIRMINGHAM · LOS ANGELES · HOUSTON

(Continued from page 133)

in such a way that the full width of the butt strap is brought into use. The pipe then is tack-welded in place, the second pipe being placed on wooden blocks and raised to sufficient height to give full working room.

It was planned to lower the welded pipe line to exact elevation with a leeway of about 600 ft. of tack-welded pipe raised about 1 ft. from true grade, all pipe back of the 600 ft. being brought down to the proper grade. Inside welds are completed first by one welding machine, followed by another welding machine for the outside welds. Prior to welding, the pipe is scraped free of coating back about 1 in. from the weld. Up to the end of April it had been possible to use as many as four welding machines on pipe laid in the trench.

On the first day of pipe laying, a light crane placed in the trench six lengths of 51x¼-in. pipe, all of which were tack-welded at the joints before night. Because of its greater stiffness, the 59x⅜-in. pipe requires more force in fitting the joint connections between adjacent sections in the trench.

Joint Welding

Before leaving the fabricating yard, pipe sections are given a 1/32-in. coating of RT-12, the hardest tar procurable today, by vertical dipping in an electrically heated kettle, as described last month. To reduce tar fumes in making the welds, particularly on the inside of the pipe, the field crews clean off the coating about an inch back from the pipe ends.

After a joint has been fitted snug in the trench, the first connection is made by tack-welding the outer edges of the half-circle butt straps to the contiguous pipe metal. The welded joint then is completed by depositing metal from coated electrodes around the three circumferential welds, one plain butt weld inside and two lapp welds outside, and by closing the plain butt joints between the matching ends of the half-circle butt straps. Various sizes of electrodes, from ⅛ to 3/16-in., and various numbers of passes, from 1 to 4, are employed as required for different parts of these welding operations. As the pipe is set permanently in position on the earth bottom of the trench (backfilled with earth on top of rock if necessary), a fair proportion of the welding involves overhead work. For the overhead welding on the outside of the pipe, bell holes at the connections are excavated large enough to permit the welder to get under the pipe invert.

About 435 field-welded connections are required in the line. Each connection of the 59-in. pipe requires 48 lin.ft. of welded joints; for the 51-in.

HOISTS

STEAM · ELECTRIC
GASOLINE · DIESEL
AND
BELT DRIVEN

- FOR OVER 69 YEARS WE HAVE BEEN BUILDING FINE HOISTING MACHINERY
- OUR DUPLICATE PART SYSTEM INSURES PROPER FIT OF OUR FACTORY BUILT REPLACEMENTS
- FOR THE DEFENSE AND OFFENSE WAR EFFORT KEEP YOUR PRESENT HOIST IN GOOD WORKING CONDITION

We can help you!

We proudly fly these flags

LIDGERWOOD
Established 1873
MANUFACTURING COMPANY
Main Office and Works: ELIZABETH, NEW JERSEY

ONAN
ELECTRIC PLANTS

Doing a Winning Job in the War

★ ONAN ELECTRIC PLANTS by the thousands are serving our Armed Forces all over the World, supplying electric current for many critical jobs.

Available in ratings from 350 to 35,000 watts, A.C. or D.C. also dual output; 50 to 800 cycles; 6 to 4000 volts; gasoline driven; air or water-cooled.

LIGHT COMPACT STURDY

We'll be glad to furnish details on your present or post-war need for Electric Plants.

D. W. ONAN & SONS
1611 Royalston Ave., Minneapolis, Minn.

pipe, the figure is 42 lin.ft. of joint welding at each connection. Pipe connections for the entire line thus require something more than 19,000 lin.ft. of field welded joints, about 12,600 lin.ft. on 51-in. pipe and more than 6,400 lin.ft. on 59-in. pipe.

Average firing-line production of welded joints, including allowances for time lost in changing electrodes, moving equipment and other operations, is: (1) for ⅜-in. plates, 5½ ft. per hr. on lap welds and 4¼ ft. per hr. on butt welds; (2) for ¼-in. plates, 8¼ ft. per hr. on lap welds and 6½ ft. per hr. on butt welds. Roughly, the pipe connections require twice as much lap welding as butt welding. At the production rate quoted above, welding time on the ⅜-in.-wall pipe amounts to 1,275 operator-hours, and that on the ¼-in.-wall pipe totals 1,665 operator-hours, giving a grand total for the field welding job of 2,940 operator-hours.

About 12 weeks of welding was available to the contractor. As the crews worked an 8-hr. day shift, six days a week, it was necessary to assume that conditions would permit welding not more than 40 hr. per week, or 480 hr. for the 12 weeks. On this basis, at least eight operating arcs seemed necessary to assure completion of the job within the time limits.

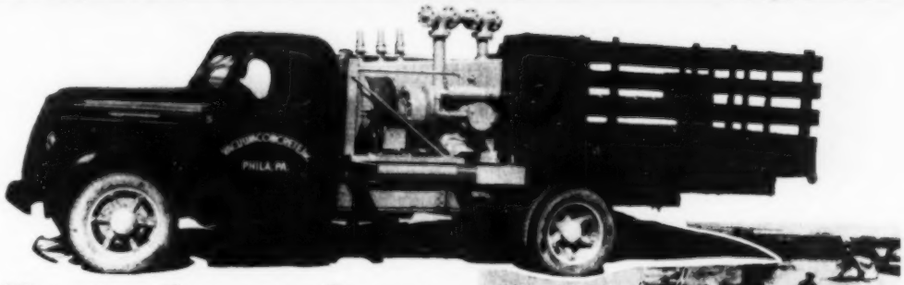
Welding Methods

In general, when doing either downhand or overhead welding, the welders start at the top of the weld and progress downward. This method requires more passes than the reverse procedure, but the actual joint welding time is less. For lap welding of ⅜-in. plates, the welders use 3/16-in. electrode and make three passes when working in the down-hand position; in the overhead position the welders make three passes with 3/16-in. electrode and a fourth pass with ⅛-in. electrode. Butt welding of ⅜-in. plate takes three passes of 3/16-in. electrode in the down position and four passes in the overhead position with the following sizes of electrodes: (1) 1/8-in.; (2) 5/32-in.; (3 and 4) 3/16-in.

On ¼-in. plate, lap welds in the down position are made with two passes of 3/16-in. electrode and in the overhead position with a first pass of 3/16-in. electrode and a second pass of ⅛-in. electrode. Butt welds in the ¼-in. plate involve in the down position a first pass with ⅛-in. electrode and a second pass with 3/16-in. electrode; in the overhead position the welded joint re-

(Continued on page 136)

ON THE JOB *and* READY
✓ When you want it
✓ Where you want it



Vacuum Concrete Process Equipment is Truck-Mounted

Aside from the savings in time and costs which it makes possible, the VACUUM PROCESS has earned for itself an enviable reputation for being on the job . . . *when* it's wanted . . . *where* it's wanted. The reason is simple: the equipment — vacuum pump, vacuum mats, hoses, etc. — are completely truck mounted. Being independent of common shipping delays, the equipment can be despatched on short notice to any part of the country . . . to coincide exactly with contractors' schedules.

Contractors are able to avail themselves of the advantages of using the VACUUM PROCESS without the disadvantage of having their capital tied up in equipment. For VACUUM equipment is furnished on a *rental* basis. A full-time supervisor accompanies the equipment, at no extra cost, to train the contractor's men in its use and to insure that maximum benefits are obtained. Since the equipment is operated by the contractor, he naturally retains full control over the job and the speed of the work.

For more data on what the VACUUM PROCESS is and how it may help you to cut time and costs, write for the pamphlets "Vacuum Concrete — Step-by-Step" and "Speed and Economy for the Contractor". Write, too, for address of our nearest representative.

More than 50,000,000 square feet of VACUUM processed floors have been laid on Navy, Army and various Federal Agency Projects within the past few years.

WHEN YOU USE THE VACUUM CONCRETE PROCESS—

- ★ You need no admixtures or dust coat applications.
- ★ You use only regular cement (but process is equally beneficial on high-early).
- ★ You use the water you need to obtain maximum placeability.
- ★ You are able to employ maximum proportion of aggregate, to produce an economical mix.
- ★ You obtain an immediate no-slump consistency, followed by high early strength — with consequent savings in finishing time, forms, heating, etc.
- ★ You achieve all the improved qualities which result from a low effective water-cement ratio.

. . . Because the VACUUM Process REMOVES the Excess Water AFTER Concrete is Placed.

Process and Equipment Pat. U. S. & Foreign Countries

VACUUM CONCRETE, Inc.
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Vacuum Concrete Process
Removes Excess Water from Freshly Placed Concrete
FOR SPEED AND ECONOMY *Plus* GREATER STRENGTH

A few territories still open for sales representation

Strict Attention to Detail in

Ransome 34-E Dual Drum Pavers

means better service—longer life

FURTHER PROOF of the fine quality built into every Ransome Paver is the use of Elastic Stop Nuts. These nuts were selected because they are self-locking and vibration proof.

Pavers are subject to tough grueling service. Fastenings must be tight and stay tight. Here, Ransome minimizes one more maintenance worry, by adopting a nut with a reputation for holding under the severest conditions.

ELASTIC STOP NUT

RANSOME MACHINERY COMPANY

Dunellen • New Jersey

YOU DON'T NEED A CARSCOOP

IF

You Have Plenty of Time And Enough Men

But not many of us have either these days. So call on the Butler Carscoop to solve your handling problems—it specializes in jobs that "can't be done." Designed for unloading bulk materials from boxcars, this machine will handle bulk cement or brass bars, dried clay or lead concentrates, with equal ease. With its 6½ foot turning radius, the Carscoop maneuvers easily within the narrow confines of a boxcar, unloading 300 bbls. of bulk cement in an hour and a quarter. Write for full information on this time and labor saving machine.

BUTLER BIN COMPANY • WAUKESHA WISCONSIN

(Continued from page 135)

quires three passes, the first with 1/8-in. electrode and the second and third with 3/16-in. electrode.

All welds are made by the shielded-arc process with Lincoln coated rods. After a pipe connection has been completely welded and subjected to hydrostatic tests, the bare metal is painted with hot tar applied by hand brushing.

Testing Line

Completed sections of the water main from 1,500 to 2,500 ft. long are tested as units by attaching water-tight dams, or bulkheads, to the ends of the sections and filling the pipe with water built up to test pressure by a 4-in. centrifugal pump. Prior to testing, the trench is backfilled around the pipe between connections, but the bell holes are left open to reveal any leakage either at the welded joints or in the backfilled pipe between the connections. The test is continued for at least 24 hr. to allow time for any leakage from the buried portion of the pipe to reach the nearest downgrade bell hole.

Backfilling Trench

As already indicated, the pipe is laid on earth subgrade at the bottom of the trench. Except for several sections passing under highways, where the pipe is protected by concrete incasement, no structural supports or protection are used along the line. Earth backfill is consolidated around the bottom and sides of the pipe with the aid of pneumatic tampers. When the earth backfill is lacking in moisture, it is sprinkled to aid consolidation.

Contract Cost

Five contractors were invited by the municipal waterworks to submit bids itemizing the estimated cost of field construction and the fixed-fee price at which they would be willing to do the work. Four bids were received. Under a regulation of the Federal Works Agency, which allotted Lanham Act funds to cover part of the cost of the supplemental main, the fixed fee was limited to 6 percent of the estimated construction cost as entered on the bid. The lowest of the bids meeting all requirements was that of Daniel O'Connell's Sons, Inc., with an itemized estimate of $150,000 for construction cost and a fixed-fee price of $9,000, making a total bid figure of $159,000. Actual construction cost is exceeding the estimate, and the final cost is expected

(Continued on page 138)

UNDER NEW WPB ORDER ALL CONSTRUCTION EQUIPMENT CAN GET VITAL PROTECTION OF "PRESTONE" ANTI-FREEZE NEXT WINTER

TO BE DOUBLY SURE OF YOUR NEXT WINTER'S SUPPLY—*ORDER NOW!*

Despite the WPB ruling, the supply hazards created by war conditions make the buying of your next winter's "Prestone" anti-freeze—*right now, this summer*—the prudent thing to do. Remember, this is the anti-freeze that:

CAN'T EVAPORATE OR BOIL AWAY

PROTECTS AGAINST RUST AND CORROSION

ONE SHOT LASTS ALL WINTER

YOU'RE SAFE AND YOU KNOW IT!

SAME AS LAST YEAR
O.P.A. Retail ceiling Price
$2.65 per gallon

SAME PRODUCT AS ALWAYS

New Limitation Order Helps Offset Hazards of Inexperienced Help in Handling War-Scarce Equipment

One purpose of the new WPB order prohibiting sales of ethylene glycol anti-freeze for use in passenger cars is to make sure the owners and operators of construction equipment get the utmost in anti-freeze protection next winter.

To construction men, faced with the turnover problem that has resulted from recent extensive recruiting by the Army Engineering Corps, the order was a welcome one. The influx of inexperienced help has brought with it problems of proper maintenance of war-scarce equipment, and has made "boil-away" anti-freeze a costly hazard to trucks, tractors, shovels, cranes, portable compressors, etc.

CAN'T BOIL AWAY

One shot of "Prestone" anti-freeze lasts all winter long. Because it contains no "boil-away" alcohol, it cannot evaporate or boil away. It will not give off fumes. It does not create a fire hazard.

Finally, "Prestone" anti-freeze contains special ingredients that protect against rust and corrosion.

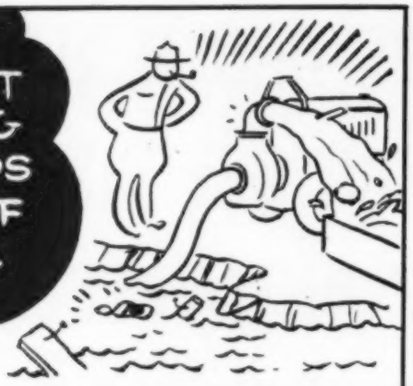
The words "Eveready" and "Prestone" are registered trade marks of National Carbon Company, Inc.

Unit of Union Carbide UCC *and Carbon Corporation*

PRESTONE ANTI-FREEZE

TRADE MARK

CONTRACTOR SMITH KNEW THAT HIS SELF-PRIMING CENTRIFUGAL PUMPS WOULD GET RID OF A SKAD OF WATER IN A HURRY

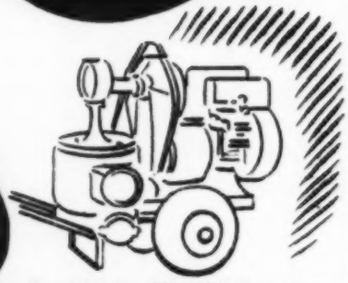


He also knew that a self-priming pump can handle more water for its size than any other pump on a dewatering job. Then again he had seen self-primers do well point work, seepage and handle sand and silt too.

In the smaller sizes of self-primers, difficulty has been experienced by contractors with all makes of pumps on these jobs. Impellers and pump cases have been chewed out long before their time. Seals fail and they take too long to prime.

—BUT HE DIDN'T KNOW THAT HE WOULD SOON WEAR THEM OUT TRYING TO PUMP A HIGH PERCENTAGE OF MUD AND SAND

FOR THESE JOBS HE SHOULD HAVE USED DIAPHRAGM PUMPS DESIGNED WITH NO CLOSE CLEARANCES BETWEEN WATER MOVING PARTS



For jobs for 6000 G.P.H. or less on which mud, sand, and trash are to be encountered, use the diaphragm pump. Seepage is another diaphragm pump job.

NOVO ENGINE COMPANY LANSING :: MICHIGAN

ASK YOUR NOVO DISTRIBUTOR FOR HIS RECOMMENDATION FOR A PUMP FOR YOUR JOB

WE ARE IN PRODUCTION ON

HOISTS

Engines

Diaphragm and Pressure Pumps

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NOVO ENGINE CO.—214 Porter Street, Lansing, Mich.
Send information on Novo Diaphragm Pumps ☐
Self-Priming Centrifugals ☐ Pressure Pumps ☐ Hoists ☐
Light Plants ☐ Pavement Breaker ☐ Engines ☐
Name _____
Address _____
City _____ State _____

(Continued from page 136)

to be $180,000 to $185,000 for field work, exclusive of the fee. Total cost of the auxiliary main was estimated last fall at $537,000, of which the Federal Works Agency is furnishing $214,800.

Direction

All plans for the water supply system of the Springfield, Mass., water supply system, including the present auxiliary main, have been made and executed under the direction of Elbert E. Lochridge, chief engineer. Construction of the supplemental main is under the immediate supervision of James B. Porter, associate water engineer.

For Daniel O'Connell's Sons, Inc., Holyoke, Mass., contractor for field construction of the line, Daniel J. O'Connell, Jr., is president, with Frank D. O'Connor, general superintendent, and Richard M. Ahern, superintendent, in direct charge of job operations.

★ ★ ★

Military Airport Paved in *Near-Zero Weather*

(Continued from page 51)

of milder weather.

Paving and finishing equipment and methods used on this job compared in general with that ordinarily employed. However, all along the line, from batching plants to the protection of the completed pavement, the operations were synchronized so that the stream of materials moved rapidly and without interruption and there was a minimum of exposure to the cold air.

Protective Blanket of Straw

Straw or hay was adopted as the most economical and convenient method of insulating the newly poured concrete pavement against cold, as the straw could be picked up and reused many times. Some 3,000 tons of hay and straw were purchased and stockpiled at convenient points along the runways.

After the newly finished concrete was sprayed with liquid curing compound of the Hunt process, the hay was spread over the surface in layers about 1 ft. thick. On top of the straw heavy waterproof paper was placed

SYNTRON
REG. TRADEMARK

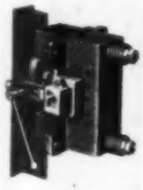
ELECTRIC HAMMERS

Save You Money and Time
CUTTING — BUSHING
DRILLING

In concrete and masonry. SPEED UP those time and labor consuming jobs with SYNTRON'S 3600 powerful, heavy blows per minute.

Pulsating
CONCRETE FORM
VIBRATORS

Save Concrete — Speed Up Placing and Setting



On wall forms — pipe forms — as vibrating screeds — also for bolting to bins, hoppers and chutes to provide a fast, free flow of sand, cement, aggregate, etc.

New complete Catalog #430 now available

SYNTRON CO. 500 LEXINGTON AVE. HOMER CITY, PA.

in 25x25-ft. sheets. This served the dual purpose of reducing heat radiation and preventing the wind from blowing away the hay covering.

Canvas Covers

For protecting freshly finished surfaces from sudden snow and rain storms, wooden frames 25x35 ft. in size, spanning the 25-ft. concreted strip, were used as supports for canvas covers. Enough of these frame covers were made up, in 25-ft. lengths to cover 800 lin.ft. of paving. The 35-ft. dimension is the width, thus giving a 5-ft. overlap on each side of a 25-ft. paved strip. These covers were used only to protect the finished surface until such time as the usual straw covering could be put on safely. Ordinarily, except during snow or rain, it was possible to leave the finished surface exposed until the straw could be safely put on.

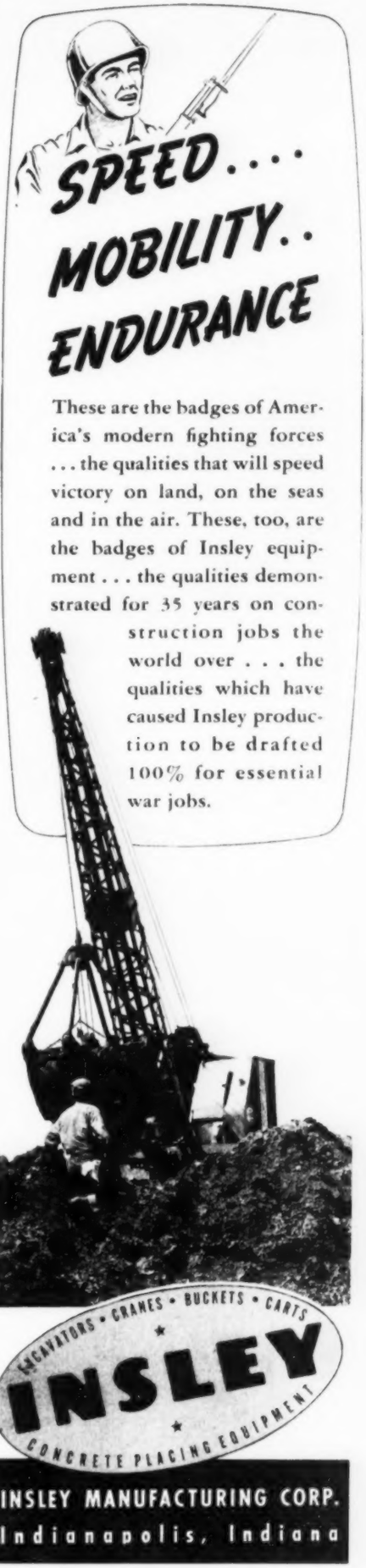
Working Temperatures

The question "At what temperature must paving operations stop?" was unanswered as this was written. On this project paving operations were carried on one day during temperatures of 7 deg. F. followed by a night temperature of 9 deg. F. below zero. Under the blanket of straw and heavy paper the temperature was 48 deg. when it was 9 below outside. The minimum temperature at which concrete pavement may be safely placed is believed to depend largely upon the efficiency of the cold weather equipment, the methods employed, and the degree of care exercised in each of these operations. Observations of the successful methods used on this project, however, seem to indicate that large scale winter concrete pavement construction, although somewhat more expensive, can be successfully carried out even though the daytime temperatures are not many degrees above zero. Paving operations were stopped on one day at 20 deg. above zero under an extremely high north wind that froze the mortar to the floats.

Concrete Placement

Average amount of concrete placed on working days in January was 5,350 sq. yd. On a typical day in February, when maximum temperature was 40 deg., minimum 11 deg., 6,689 sq. yd. of pavement was placed.

Just how much the necessary winter precautions have increased the cost of paving has not been definitely determined at this writing. For the varying degrees of protection required as the temperatures have fluctuated, the additional cost is estimated to have varied within the range from 10 to 25 percent.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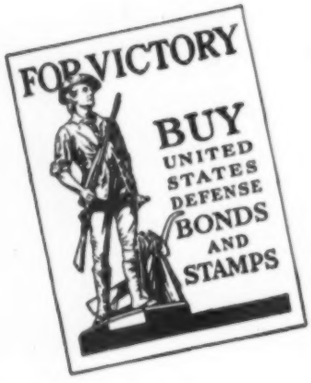
MOBILITY..
ENDURANCE
These are the badges of America's modern fighting forces ... the qualities that will speed victory on land, on the seas and in the air. These, too, are the badges of Insley equipment ... the qualities demonstrated for 35 years on construction jobs the world over ... the qualities which have caused Insley production to be drafted 100% for essential war jobs.
EXCAVATORS • CRANES • BUCKETS • CARTS
INSLEY
CONCRETE PLACING EQUIPMENT
INSLEY MANUFACTURING CORP.
Indianapolis, Indiana

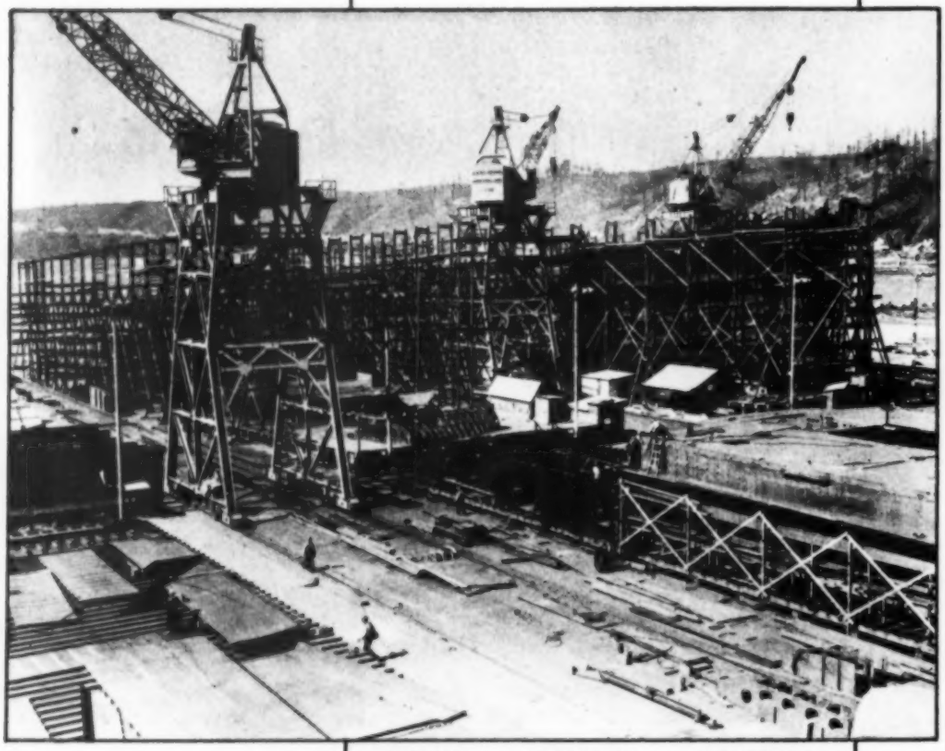


BUILDING for VICTORY

Wartime construction and production demands full efficiency in every material handling unit. Clyde equipment have time proved their dependability on all kinds of jobs. Their rugged construction, scientific design and unexcelled performance records, assures a continuous and safe working schedule . . . day after day . . . month after month.

This year, more than ever before, ultimate speed in building and in handling materials and supplies, is of paramount importance.

A new Bulletin L-12, showing Clyde Whirleys handling materials at shipyards, construction projects, industrial plants and loading depots, is available. Write for your copy.



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CARPULLERS . . . DREDGE and DOCK
EQUIPMENT . . . DECK MACHINERY

CLYDE

CLYDE IRON WORKS, Inc.
Duluth, Minnesota

ARMY E NAVY

For High Achievement

NEWS FROM MANUFACTURERS

(Continued)

PULLEY LAGGING — **Victor Balata & Textile Belting Co.,** 53 Park Place, New York City. (1-p. circular). Full description of "Grip-On" pulley lagging and of most efficient methods of applying it to pulleys. Pile-face surface, designed to promote better traction and longer belt life is woven as integral part of lagging body, yet imparts no tension strain on base which maintains snug fit on pulley. Solid woven base prevents bolts or screws from pulling out.

★ ★ ★

PORTABLE MATERIAL HANDLERS — **The Jeffrey Manufacturing Co., Columbus, Ohio.** (Three 12-20-p. illustrated catalogs). To assist contractors in solving their material-handling problems, this company has made available three catalogs — one on portable scraper-conveyors, wheel and crawler mounted types, for low-cost handling of coal and coke in coal yards and industrial plants; a second on troughed and flat-belt type portable belt conveyors for low-cost handling of all classes of loose material and a third on portable bucket loaders for reclaiming coal, coke, sand and crushed stone from ground storage.

★ ★ ★

MECHANICAL AND INDUSTRIAL RUBBER PRODUCTS — **Continental Rubber Works,** Erie, Pa. (8 pp., illustrated). Describes briefly items of Vitalic rubber goods line that are of particular interest to industrial field as a whole, such as molded and extruded rubber goods, various types of hose, rubber rolls, removable rubber liners for steel drums, sheet packing, friction tape, oiled clothing, conveyor and transmission belting and rubber mallets.

★ ★ ★

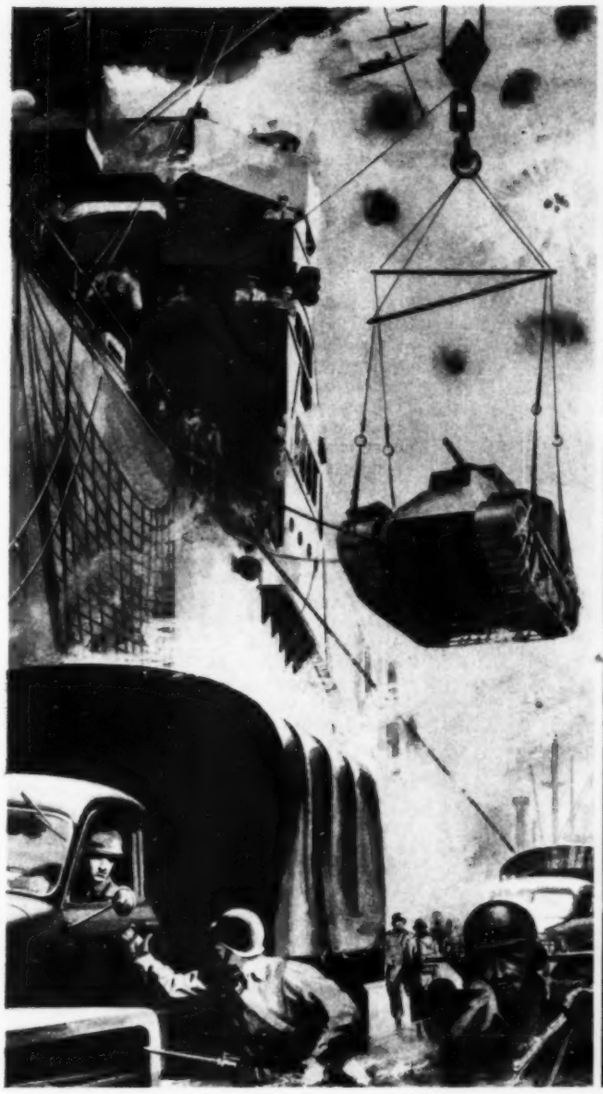
MANUFACTURERS SAGA — **Pioneer Engineering Works,** Minneapolis, Minn. (20 pp. illustrated). Answers question, "What does Pioneer do?" discussing such subjects as "The Pioneer Idea and How It Grew," Pioneer engineering talent and craftsmen, strategic location, tools, up-to-date plant, modern techniques; service to Uncle Sam, gravel, quarry and mining industries and to railroads and foundries. Photographs of Pioneer bituminous equipment and belt conveyors and of interchangeable and replaceable units.

★ ★ ★

HEAD AND BODY PROTECTION FOR WAR WORKERS — **The Strauss Company,** 925 Liberty Ave., Pittsburgh, Pa. (6-p. bulletin, illustrated). Describes line of vulcanized fiber protector helmets for both men and women, welders' helmets, rain and storm capes and new line of safety hats and breast protectors for factory women.

★ ★ ★

CRANE-DRAGLINE-SHOVEL — **Link-Belt Speeder Corp.,** 301 W. Pershing Road, Chicago, Ill. (24 pp., illustrated). Covers 2- to 3-yd. Speed-O-Matic series "500" incorporating usual features of this type: hydraulic control; hydraulically-controlled steering and braking; self-aligning rotating rollers; non-clogging crawler treads with rigid drive and interchangeable crawler side frames. Lower frame is 31 in. deep with totally inclosed travel gears running in oil and totally inclosed steering and travel brakes. Minimum ground clearance, 16 to 25 in. Eight pages devoted to dimensions, clearance diagrams, working ranges, lifting capacities and brief specifications.



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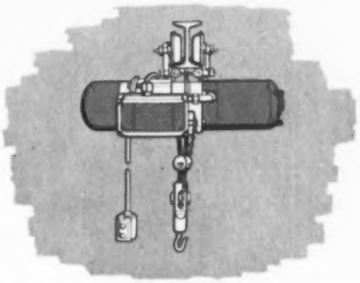
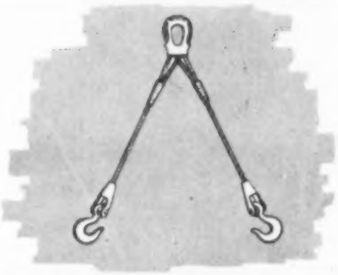
Salient POINTS IN CMP Re: *Buying Wire Rope*

WHEN BUYING WIRE ROPE FOR INCLUSION IN A PRODUCT YOU ARE MAKING,



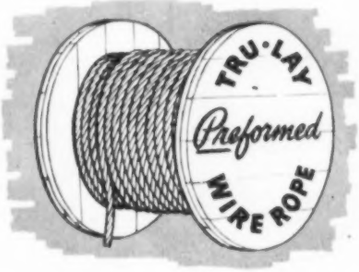
REMEMBER: Wire rope is a Controlled Material • Your orders should bear the abbreviated allotment numbers—such as: W-8-20 • Preference ratings on orders bearing allotment numbers are valueless. Wire rope producers are required to fill authorized controlled materials orders without regard to preference ratings • The allotment number on a wire rope order must show the actual month of delivery and *not* the quarter in which delivery is required.



WHEN BUYING WIRE ROPE ASSEMBLIES,

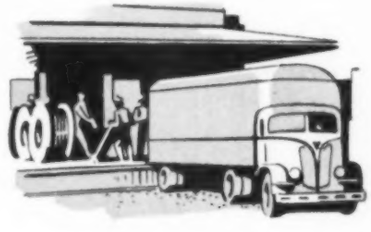
REMEMBER: Assemblies consisting of wire rope and fittings are Class B if they are air-borne, but Class A if they are not • If Class A, you must furnish us with an allotment of the steel required for the wire rope, and for the fittings if they are also class A • If Class B, you must not furnish an allotment of steel for either the fittings or the rope • In either case, your orders must bear allotment numbers or they cannot be considered delivery orders for products containing controlled material.

WHEN BUYING WIRE ROPE FOR MAINTENANCE, REPAIRS, OR OPERATING SUPPLIES,



REMEMBER: Subject to the limitations imposed upon you by any "P" order under which you may be required to operate, and provided you produce a product or are engaged in any business in Schedules I or II of CMP Reg. 5, the symbol MRO on a wire rope order, followed by any appropriate certification, makes your order an authorized controlled material order, and • A preference rating is not required, because wire rope is a controlled material • Just be sure to observe the quantity restrictions stated in Par. (f), CMP Reg. 5.

WHEN BUYING WIRE ROPE IN SMALL QUANTITIES FROM WAREHOUSES,



REMEMBER: You don't need an allotment number or a preference rating for wire rope if • **1**—You order in amounts of $10 or less, • or **2**—If you don't buy more than 4,000 pounds per calendar quarter, or • **3**—If you are authorized to buy it under Food Production Order 3 • Just be certain that you don't exceed the inventory limitations stated in CMP Reg. 2 • Certify your orders as stated in CMP Reg. 4.

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